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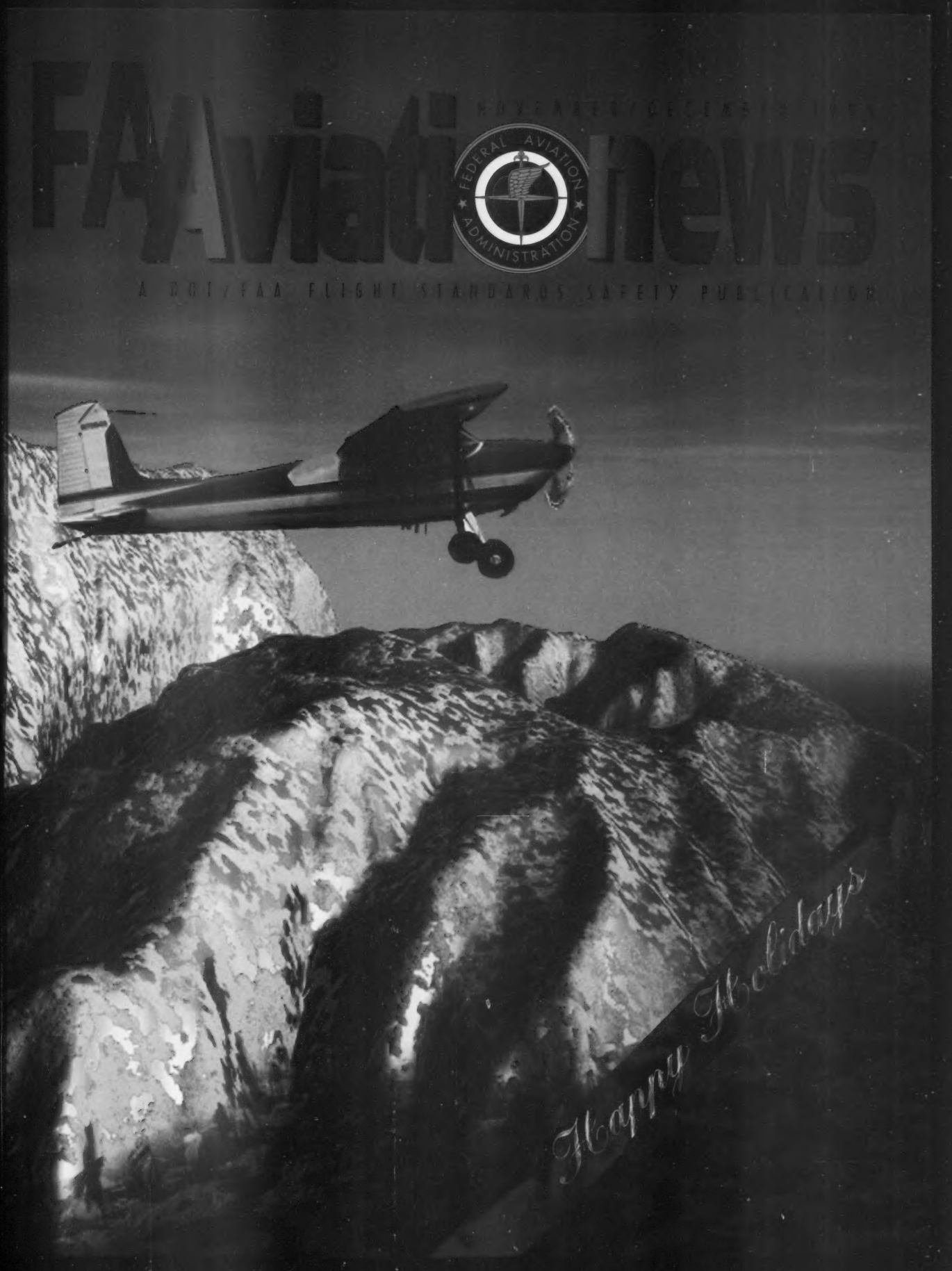

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H. Dean Chamberlain

The Clean Aircraft Concept

PART TWO

by Phyllis-Anne Duncan

Part One of this article (October 1995), discussed how aircraft on the ground can accumulate frozen contamination and how that frozen accumulation—whether ice, snow, or frost—can degrade aircraft performance if not removed. We also stressed that a visual inspection—a thorough preflight, giving particular attention to critical areas—was the best way to detect frozen contamination. This visual inspection falls under PIC responsibility for a safe flight.

Even if the pilot doesn't detect any frozen contamination on the aircraft during preflight—maybe it was stored in a warm hangar overnight, the best winter preflight scenario—that doesn't mean it can't accumulate. You may have started taxiing with an ice-free aircraft, but by the time it's your turn to roll you could have picked up performance-degrading ice, snow, or frost.

FAR Parts 135 and 125 require a pretakeoff contamination check within five minutes before takeoff. The pretakeoff contamination check lets the pilot make sure the wings and control surfaces are free of frost, ice, or snow. The aircraft may already have been deiced, but the check must still be made because ice, snow, or frost could have accumulated on control surfaces, wings, or the critical areas in the time between deicing and takeoff. (FAR Part 135 and 125 operators must have procedures for this pre-takeoff contamination check approved by the operator's FAA principal operations inspector. The procedures must be referenced or described in the operator's operations specifications.)

If you operate solely under FAR Part 91, this pretakeoff contamination check is not required of you, but we think you'll agree, it's a good idea for any aircraft operating in winter weather conditions.

In some aircraft the whole wing and portions of the empennage are visible from the cockpit. In other aircraft only a portion of them may be easily seen

H. Dean Chamberlain

from the cockpit. For example, in high-wing aircraft only the undersurfaces of wings and the undercarriage are easily visible from inside. Some operators have a practice of one pilot performing a visual check of components visible from the cockpit, but the PIC can require the assistance of "trained and qualified" ground personnel to conduct the pre-takeoff contamination check.

The PIC should look for and examine any evidence of melting snow and possible refreezing. If the aircraft has been treated with deicing or anti-icing fluid, aircraft surfaces will appear glossy, smooth, and wet. If the pretakeoff contamination check reveals any accumulation of ice, snow, frost or an ice formation caused by taxiing in frozen slush or snow, the aircraft should be deiced/anti-iced again.

Deicing and Anti-icing Equipment and Facilities

General

In clear weather, manually deicing (wiping or scrapping or letting the accumulation melt on its own) the aircraft will allow for a safe takeoff and flight. In inclement, cold weather, however, the only recourse may be to hangar the aircraft to clean it. Most commonly, aircraft are deiced in a hangar and then have a protective coating of FPD fluid applied before going out into the cold. This will only protect the aircraft for a limited time before takeoff.

[Note: Most deicing of FAR Part 91 aircraft is "deicing" not "anti-icing." In fact, the most effective "anti's" (type II) are not recommended for aircraft with takeoff speeds under 85 knots.]

Airport size and configuration and available hangar space may be additional limitations to indoor deicing. Many airlines provide ramp deicing, and some airports have deicing facilities or equipment at a central location on the airport.

Warm Hangars

Not only does a hangar keep heat and birds away in the summer, it shelters the aircraft from the harsh winter winds and blowing snow and sleet.

Wing and Other Covers

This may be the most practical method for the general aviation aircraft—the use of covers for wings and other critical components. Covers are useful in lessening the extent of manual removal or use of deicing fluids, but they seldom keep all the frozen contamination off. Snow, for example, can be blown through gaps in the covers or into exposed aircraft surfaces.

Mechanical Methods

Pilots have used brooms, brushes, ropes, squeegees, fire hoses, etc., to remove dry snow, to remove large, wet snow deposits, or to polish frost. Much care must be taken not to damage the aircraft skin or protruding components such as pitot tubes or antennas when using any of these devices.

Deicing and Anti-Icing Fluids

Deicing fluids will quickly remove frost and anti-icing fluids will prevent or retard ice formation during storage overnight. These fluids can also be used to assist in melting and removing snow or other ice formations from freezing rain or drizzle. They can also help remove residual ice or frost from a previous flight.

Deicing Equipment used for Small Airplanes

There are various methods for dispensing and applying FPD fluids—portable, pressurized containers with spray wands, mopping the fluid on from a bucket, pumping the fluid on by hand pump then spreading with a mop, applying and spreading with a brush, etc. Applications such as these melt the ice to a point where it can be removed by manual means.

Ground support equipment also vary in type. They can be simple trailers hauling a 55-gallon drum of FPD fluid, which is hand-pumped onto the aircraft and spread with a mop. The ground support equipment can also be highly sophisticated and capable of heating and dispensing large quantities of water and deicing fluid. This equipment may also have "cherry pickers" which enable deicing personnel to reach the tops of large aircraft. However, use of this type equipment may not be good for small airplanes. They operate under high pressures and high temperatures which could damage small planes.

Some airports have a central deicing location at the departure end of a runway. The advantages of this arrangement are that it provides an excellent place for conducting the pretakeoff contamination check, and it reduces the time between deicing and takeoff.

Deicing and Anti-icing Fluids

Common practice in the U.S. and Europe is to deice (remove accumulation) then anti-ice (protect from further accumulation) aircraft before takeoff using various concentrations of FPD fluid. The anti-ice, protective coating delays the reformation of ice, snow, or frost. Commercially available FPD fluids are usually ethylene glycol or propylene glycol based. (See Table 1 for general characteristics.)

When deicing, FPD fluids decrease the freezing point of water in either the liquid or crystal (ice) state, but FPD fluids are highly soluble in water. Ice is slow to absorb it or to melt when in

Table 1. General Characteristics of Commercially Available FPD Fluids

Common Name	Primary Active Ingredients	Primary Viscosity	Use	Notes
Traditional North American	Ethylene, propylene, diethyine glycols and/or isopropyl alcohol	Low	Deicing	Includes SAE AMS 1425, SAE AMS 1427, AF 3609, MIL-A-4823, other pre-1983 MIL-Spec fluids and other commercially available fluids
AEA Type I SAE Type I ISO Type I	Propylene and/or diethylene glycol	Low	Deicing	Propylene glycol based fluids not to be used undiluted at OAT <14°F; aircraft performance changes may result
AEA Type II SAE Type II ISO Type II	Propylene and/or diethylene glycol and polymeric thickeners	Low High	Anti-icing	For use on aircraft with V_R > 85 kts.; lower viscosity than AEA Type II produced before 1988
Old Mil Type I New Mil Type I	Ethylene propylene glycol Propylene glycol base	Low Medium	Deicing	No fire inhibitor; may not conform to SAE Type I spec. See AC 20–117 for details.
Old Mil Type II and New Mil Type II	Ethylene and propylene glycol	Low	Deicing	With fire inhibitor; does not conform to SAE Type II Spec. See AC 20–117 for more details.
Arktika Arktika 200	Ethylene glycol and thickeners	Low High	Deicing Anti-icing	Not currently approved as AEA, SAE, or ISO Type I or II. Effects on aerodynamics unknown. Prevalent in Russia.

contact with it. Heating the FPD fluid helps the process, but as the ice, etc., melts, it dilutes the FPD fluid, which then begins to run off. If all the ice has not melted, the aircraft may need additional applications of FPD fluid until it is totally free of frozen contamination.

When all the ice has melted, the liquid residue is a mixture of water and FPD fluid, which can refreeze with only a slight temperature decrease.

Table 1 shows us that there are many different types of FPD fluids manufactured in North America and Europe.

Traditional North American Fluids

FPD fluids used in North America are usually composed of ethylene or propylene glycol in combination with water and other ingredients. Users can purchase this fluid in concentrated form (80% to 90% glycol) or in a solution 50% water and 50% glycol.

SAE and ISO Type I Fluids

In the concentrated form, these fluids contain a minimum of 80% glycol. They are considered "unthickened" because of their low viscosity. They are used heated and diluted for deicing, but their anti-icing protection is limited.

SAE and ISO Type II Fluids

Containing a minimum of 50% glycols, these fluids are considered "thickened" because a thickening agent has been added. This enables the fluid to be deposited in a thicker film that remains on the aircraft's surfaces until takeoff. These fluids are used for anti-icing, and they do provide greater protection than the Type I fluids. Because of their high viscosity and pseudoplastic (ability to conform to the shape of something) properties, Type II fluids are highly effective anti-icers. They remain on the wings during ground operations or short term storage to provide anti-icing protection then shed off the surfaces during takeoff roll without adverse effect on aerodynamic performance. However, Type II fluids are designed to be used *only on aircraft with a rotation speed greater than 85 knots*. Aircraft manufacturers should be consulted regarding their approval of type II fluids regardless of rotation speed.

Improper handling or use of improper equipment can alter the pseudoplastic characteristics of Type II fluids, and they can lose 20% to 60% of their effectiveness.

Military Deicing Fluids

The 4 types of military deicing fluids are:

1. MIL–A–4823C Type I—standard
2. MIL–A–4823C Type II—standard with a fire inhibitor
3. MIL–A–4823D Type I—propylene glycol base

4. MIL–A–4823D Type II—ethylene and propylene glycol mix

However, military types I and II fluids are not related to SAE and ISO Types I and II fluids.

SAE Type III Fluids

Fluids for use on small aircraft which would last longer but would have minimal aerodynamic effect are being developed and are referred to as Type III. The use of these fluids is still being tested, i.e., mostly on large aircraft. Some have been referred to as Type 1½ fluids because their characteristics fall halfway between Type I and Type II.

Antifreeze and Unapproved Fluids

Because some fluids may not be compatible with aircraft materials and finishes, use only fluids approved by the aircraft manufacturer. Unapproved fluids, such as automotive antifreeze, could impair aircraft performance and flight characteristics or could cause control surface instability. Consequently, automotive antifreeze is NOT approved. Also, its time of effectiveness (holdover time) and its effects on aircraft aerodynamic performance are not known.

Characteristics of FPD Fluids

Chemical Composition

Although FPD fluids are of the ethylene glycol, diethylene glycol, or propylene glycol family, their specific formulae are proprietary. Any commercially available FPD fluid contains one or more of the glycols plus small quantities of additives and water. Before use operators conduct a quality control check specified by the fluid's manufacturer. Pilots of small aircraft must understand how critical effective quality control can be if they opt to use deice/anti-ice services.

Freezing Characteristics

Fluids are either premixed (diluted with water) by the manufacturer or mixed by the user. To ensure known freezing characteristics, the user must analyze samples of final mixtures according to manufacturer guidelines before use on the aircraft. This, of course, doesn't mean the pilot has to take the samples and run them through a portable gas spectrometer. The contractor or FBO providing the deice/anti-ice service checks all fluids before use.

Fluid Strength When Applied

Fluid strength—the ratio of glycol to water—should be known before application to assure proper mixing and application. Fluid strength is a significant factor in the fluid's deicing and anti-icing properties, and it also affects the time the fluid remains effective.

The freezing point of pure ethylene glycol is much higher than when it is diluted with water. Cold-soaked fuel in integral tanks, aircraft skin temperature, ambient cooling, wind, and lower temperatures during lift development can induce temperature decreases in pure fluids and cause re-freezing. An aircraft would then have to be deiced/anti-iced again before it is released for flight.

Full-strength (undiluted) propylene glycol forms a protective film that is quite viscous. It may not blow off at normal rotation speeds but may "pile up" non-uniformly along critical lift surface, reducing lift up to 20%.

Temperature Buffer

American Practice

Anti-icing practices developed in North America using traditional North American fluids ensure that the remaining film of FPD fluid has a freeze point of at least 20°F below the ambient temperature.

European and Canadian Practice

The temperature buffer for SAE and ISO Type I fluids in Europe and Canada is at least 10°C (18°F) below the ambient temperature. (The only difference from the American buffer is merely the metric conversion factor.) For SAE and ISO Type II fluids, the buffer should be at least 7°C (13°F) below the ambient temperature. The different buffers between Type I and Type II accommodate differences in fluid dilutions rates during freezing precipitation. The thicker, Type II fluids don't dilute to the same extent.

Current FAA Recommendations

Generally, the holdover time increases with the expansion of the temperature buffer. If there is a choice, use the maximum buffer. This requires the use of more glycol—more expensive and more spillage and runoff to be collected. Use the following factors in the listed order of priority when making your decision:

1. Safety
2. Availability
3. Environmental impact
4. Cost

FAA's recommendation is that the fluid freeze point should be at least 20°F below the colder of either the ambient temperature or the aircraft surface (skin) temperature. This recommendation takes into consideration:

- Temperature reduction during climb or in the production of lift and the possibility that residual fluids will freeze at altitude
- Freezing potential in conditions conducive to icing
- Quality control margin for error

Note that a greater temperature buffer provides a longer holdover time.

Holdover Times

Holdover time is the estimated time deicing/anti-icing fluid prevents the formation of frost or ice and the accumulation of snow on protected surfaces. It begins when the final application of fluid commences and expires when the fluid loses its effectiveness. Holdover timetables are found in AC 135–17, "Pilot Guide—Small Aircraft Ground Deicing." The timetables are based on fluid type, concentration, OAT, and various weather conditions. Other variables affecting holdover times are:

- Aircraft surface (skin) temperature
- Operation in proximity to other aircraft, equipment, and structures
- Operation on snowy, slushy, or wet ramps, taxiways, and runways
- Precipitation rate
- Relative humidity
- Wind velocity and direction

Now What?

Now that you know everything you ever wanted to know about FPD fluids but were afraid to ask, what's next? You get the aircraft deiced and anti-iced.

But that's next time. ■

Part Three in the next issue will cover deicing and anti-icing procedures, including cautions and health warnings.

Rime and Clear and Mixed, Oh My!

by Phyllis-Anne Duncan

The pilot was only going to fly his newly purchased Cessna 140 three miles to the airport where he was going to store it in a hangar, safe from winter's wild weather. The ceiling was 500 feet overcast, five miles visibility, and fog and freezing rain were present. The windshield iced up, and the pilot opted for a precautionary landing which caused substantial damage to the airplane. Accident investigators determined the PIC as the probable cause for disregarding weather information and for flight into know adverse conditions.

Even after receiving three complete weather briefings indicating icing and including PIREP's on icing, a Bonanza *pilot departed on an IFR flight into known icing conditions. Less than an hour later, the pilot reported leading edge wing ice one inch thick. Controllers lost communication with the pilot while issuing vectors to a nearby airport. The aircraft crashed in a farm field, and the wreckage was spotted by a passing motorist. Accident investigators cited the 4,000-hour pilot as the probable cause—poor preflight planning/preparation, poor inflight planning/decisions, poor weather evaluation, for attempting flight into known adverse conditions, and for poor judgement.*

The pilot of another Bonanza *told investigators he had not received any PIREP's for icing, but a weather briefer indicated providing one PIREP and one SIGMET for icing along the pilot's proposed route. While en route, the pilot had to divert because of low ceilings and encountered heavy rain. The pilot then noticed an ice build-up. As he began an instrument approach, the build-up had grown to one inch, and the pilot had to apply full power to maintain speed. When over the approach lights, the pilot slowly reduced power and lowered the gear. The airspeed dropped, the left wing stalled, and the aircraft hit a snow bank 40 feet short of the runway. Post-accident examination revealed a one-inch thick layer of mixed rime and clear ice on the leading edges of the wings and tail. Accident investigators cited the PIC as probable cause for improper planning/decisions and for flight into known adverse weather.*

Although the pilot had been issued PIREP's for icing during the preflight weather briefing, the pilot took off in a PA–32, Cherokee Six, *not equipped for icing conditions. Soon after takeoff, the pilot reported instrument problems then an ice accumulation of one-half inch. The pilot reported losing then regaining aircraft control before making a forced landing. Accident investigators cited as probable cause the weather conditions as well as the PIC, for flight into known adverse weather and for an inadequate weather evaluation.*

There are about 50 general aviation accidents each year involving airframe icing. In a random look at 10 accidents one year, we found that the PIC was cited as the probable cause in all 10, usually with the addendum "poor preflight planning/decisions" and "flight into known adverse weather." With the wealth of weather forecasts and reports available for preflight planning, these accidents are mostly avoidable.

The psychological reasons why a perfectly rational pilot, who avails him-

or herself of all this information, flies into icing conditions are varied and not the subject of this article. Maybe what these PIC's lacked was a little icing knowledge. When it comes to aircraft structural icing, a little knowledge should go a long way because it doesn't take much to know that icing is scary and that the only good use for it is as ice cubes in your drink.

The three-part article, "The Clean Aircraft Concept," deals with ground icing, but here we'd like to talk about structural icing that accumulates in flight.

AC 00–6A, "Aviation Weather," states quite simply that, "Aircraft icing is one of the major weather hazards to aviation." That is really somewhat of an understatement since icing is insidious, cumulative, and sometimes invisible. It can decrease thrust, reduce lift, and increase drag. It can slow the aircraft down, force it downward, or make it go out of control. Engine performance can suffer, and icing can also contribute to false indications on instruments and loss of radio communication. It may freeze a landing gear to the point where gear can't extend or retract fully, and it can stop brakes from working properly.

In the face of all these negatives, why place oneself in so much danger by flying at all in the winter? Some pilots do remove themselves from winter flying's challenges by "grounding" themselves for the duration. But with careful preparation and planning, you don't have to miss out on winter flying's *advantages*: great aircraft performance, generally more stable air, and beautiful snow-covered scenery.

Structural icing and *induction icing* occur in flight, but we will deal here with structural icing, a primary concern to instrument pilots in the winter.

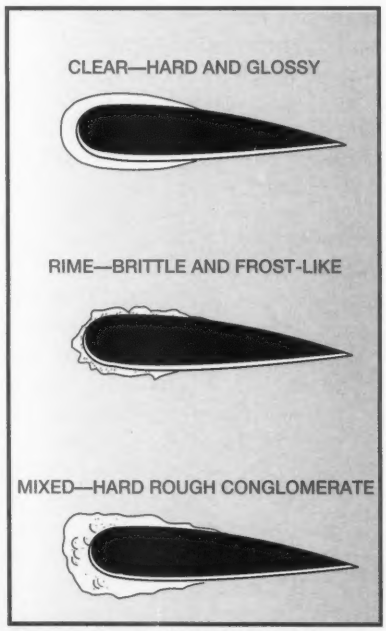
You only need two ingredients for structural icing—the presence of visible moisture and temperatures at or below freezing. Cooling that occurs when lift is produced can reduce aircraft skin temperatures to below freezing even if the ambient air temperature is above freezing. *Supercooled water* is water still in a liquid state even though its temperature is below freezing. When a cold aircraft strikes a supercooled drop of water, part of the drop freezes instantly, adhering to the aircraft's skin. Friction warms the remaining portion of the supercooled water, but aerodynamic cooling can cause it to refreeze. How that remaining liquid freezes determines what kind of ice forms on the aircraft, either *clear, rime,* or *mixed*.

Clear Ice

If after initial impact the remaining liquid from the supercooled drop flows out over the aircraft's surface and gradually freezes, it will form a smooth sheet of ice. Large drops, as found in rain or in cumuliform clouds, create clear ice. Clear ice (sometimes translucent) is hard and glossy, heavy and tenacious. Clear ice, as the accumulation increases, can build up in a horn-like shape on leading edges, either a single horn or a double horn; consequently, aircraft inflight deicing equipment may be incapable of removing such large build-ups of clear ice. This horn-like accumulation produces a very large increase in drag and a correspondingly inverse decrease in lift.

Rime Ice

When the supercooled drops are small, such as in a light drizzle or moisture in stratified clouds, the liquid remaining after initial impact with the aircraft freezes quickly before the liquid has time to spread out over the surface. The small, frozen drops trap air between them, giving rime ice a rough, milky, opaque appearance—the look of your freezer (if not a frost-free) before you defrost it.



Clear, rime, and mixed icing on airfoils.

Although lighter than clear ice, rime ice has an irregular shape and a surface roughness, both of which reduce aerodynamic efficiency, i.e., reduce lift and increase drag. Because it is brittle, rime ice is more easily removed with aircraft inflight deicing equipment.

Mixed Clear and Rime Icing

When supercooled drops vary in size or are mixed with snow or ice particles, a combination of clear and rime ice can form and form rapidly. Ice or snow particles can actually imbed in the clear ice and create highly irregular shapes on airfoil leading edges.

Regardless of the form icing takes, the amount of the accumulation is directly proportional to the amount of liquid water in clouds. The worst case scenario involves large water droplets, temperatures close to freezing, and clouds with a high liquid-water content.

Effects of Icing

On an ice-free wing, lift increases with an increase in the angle of attack until the wing's critical angle of attack is reached. Accumulations of ice reduce lift, and maximum lift will occur at a lower angle of attack. (Figure 1) The coefficient of drag increases tremendously. Thrust is also decreased because of ice buildup on propeller blades. All of these effects are cumulative, and soon you may need full power and a high angle of attack to maintain altitude. However, this attitude gives you a new problem: Ice can now form on the underside of the wing, adding more weight and drag. The need to get out of the icing conditions at this point is crucial.

Reduction of lift is the most important effect of ice on the wings and tail. An aircraft can lose 30% of its lift with just a small accumulation, and the stall speed can *increase* 15%. The next one is a real kicker—as if the loss of lift isn't depressing enough: When ice con-

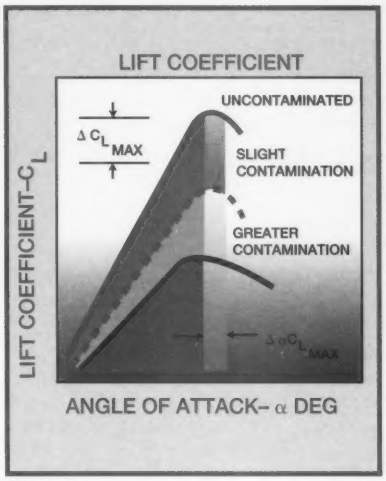


Figure 1.

forms to the shape of the wing, drag can increase ***200%***! Horn-shaped ice can mean a drag increase of 300% to 500%!!

Icing Intensities

When do you have too much ice? Some may say any ice is too much, especially when you look at the figures for lift reduction and drag increase in the above paragraph. Is a trace okay? Is light icing more or less than a trace? A trace of ice may seem pretty severe if it's your first encounter.

FAA has defined some descriptions of icing intensity, used primarily when pilots report icing conditions. These descriptions will show up in reports and forecasts, and so they can be useful in preflight planning as well.

1. **Trace:** You can just barely see the ice. Trace ice is not usually hazardous, and aircraft inflight deicing/anti-icing equipment is probably not necessary unless the aircraft is exposed for an hour or more.
2. **Light:** Accumulations of this intensity require occasional use of inflight deicing/anti-icing equipment. Light accumulations may create a problem for exposure longer than hour and if deicing/anti-icing equipment is not used.
3. **Moderate:** Moderate ice accumulates at a rate that short encounters are potentially hazardous and use of deicing/anti-icing equipment is necessary.

Some Points to Remember about Icing

- Before you takeoff, check the weather for possible icing areas along your planned route. Check PIREP's, and, if possible, talk to other pilots who have flown along your route.
- If your aircraft is not equipped for flight into known icing, avoid areas of icing. Rule of Thumb: Moisture must be visible and outside air temperature must be near 0°C or colder.
- Always remove ice, snow, or frost from critical areas before attempting takeoff.
- When possible, avoid taxiing or taking off through mud, water, or slush. If you do, make a preflight check for the freedom of movement of the controls.
- When climbing out through an icing layer, climb at a slightly faster airspeed to avoid a stall.
- Use the aircraft's icing protection (if equipped) when accumulations are not too great, but not to soon as to render the boots ineffective (follow the manufacturer's instructions). When your equipment can no longer deal with the accumulation, change course or altitude to get out of the icing as soon as possible.
- If your aircraft does not have a pitot-static system deicer, be alert for false readings from the airspeed indicator, rate-of-climb indicator, and altimeter.
- In stratiform clouds you can likely alleviate icing by changing to a flight level with an above-freezing temperatures or to one colder than –10°C. An altitude change may also take you out of clouds. Rule of Thumb: Rime icing in stratiform clouds can be very extensive horizontally.
- In frontal, freezing rain you may be able to climb or descend to a warmer layer. Temperature is always warmer than freezing at some higher altitude. Rule of Thumb: If you're going to climb, do so quickly; if you're going to descend make sure you know the temperature and the terrain below you.
- Avoid cumuliform clouds if at all possible. Clear ice may be encountered anywhere above the freezing level, but the most rapid accumulations are usually at temperatures from 0°C to 15°C.
- An aircraft with a heavy coating of ice has lost aerodynamic efficiency; consequently, avoid abrupt maneuvers.
- When "iced up" on approach, fly with more power than usual. When you're iced up, you are your own test pilot.
- Consider going to an airport with longer and wider runways if safety might be compromised.
- Periodically check with Flight Watch on 122.0 or Flight Service on the appropriate frequency for updates on the weather as well as new PIREP information.
- Be sure to provide periodic PIREP on icing conditions or the absence of them.
- Always leave yourself an out.

4. **Severe:** This is so much ice that deicing/anti-icing cannot reduce or control the accumulation. The only thing to do in this case is get out of the icing.

Clouds and Ice Formation

As we've stated there must be visible moisture and temperatures at or below freezing for ice to form. Clouds are the greatest source of that visible moisture, but does it always mean that clouds and low temperatures make ice? Not always. To form, icing likes a temperature range from 0° to about –10°C. At temperatures colder than –20°C, ice is rare, but don't automatically assume you'll be ice-free. Temperature can vary in clouds, and you could go from an ice-free zone into an icing one.

Stratus clouds have a very thin layer where icing occurs, usually only a 1,000 feet or so thick. A small change in altitude in stratus clouds could get you out of this narrow ribbon of ice. However, stratus clouds cover great distances. Low-level stratus clouds produce rime icing, but thick, extensive stratified clouds with continuous rain (altostratus and nimbostratus) have a lot of liquid water. In winter these cloud systems can cover thousands of square miles and present conditions for protracted exposure to icing. In thick stratified clouds, there is more liquid water at warmer temperatures, and heavy icing in these clouds can occur at or slightly above the freezing level.

Severe icing conditions can be found in stratus clouds over or downwind of large bodies of water, and when the clouds are lifted by convection over water or mountains, they become stratocumulous. That can mean thick layers of mixed clear and rime icing.

Cumulous clouds because their moisture is being lifted can produce the severest icing. The water droplets in cumulous clouds are larger than stratus, and when they strike the aircraft, they form a film of water that can freeze into clear ice. The layer of icing can be thousands of feet thick in cumulous clouds. Cumuliform clouds are vertical, so prolonged exposure to icing conditions occurs only in a broad zone of storms or heavy showers.

Cumuliform clouds in winter are best avoided altogether, and you will find that PIREP's on icing conditions in them are rare. If you encounter ice in cumuliform clouds, divert or descend into warmer air immediately.

Snow and Freezing Rain

Snow doesn't usually stick to an aircraft unless it is wet snow. If snow starts to stick to your aircraft, treat it as you would any structural icing: climb, descend, divert, whatever, to get out of it.

Freezing rain is created when warm, moist air aloft overruns cold air (subfreezing) at the surface. Rain falls through the warmer air into the colder air and becomes clear ice. However, encountering freezing rain gives you a clue as to your way out. The air above you is warm—climb for it. Freezing rain usually accumulates at the moderate to severe intensity, and it is better avoided, even if the aircraft is certificated for flight into known icing.

Where to Look

The leading edges of your airfoils or any objects that protrude into the air flow (antennas, OAT probe, etc.) are likely going to be the first place where ice will form. As it travels through the air, the leading edge of a wing, for example, disturbs the pressure field around it. This creates a pressure wave ahead of the wing. Air moves smoothly around the curve of the wing, and droplets of water try to make the turn as well, but they are too heavy. Instead, they collide with the leading edge and, under the right conditions, form ice.

If you are in a low-wing airplane, spotting this leading edge accumulation is easier than in a high-wing plane. In a high-wing plane, you may see only what looks like trace amounts of ice, while a big horn of ice could be just out of sight. Just like scanning for traffic, move your head a little to scan for ice accumulations.

Also, if you have an accumulation on the leading edges of your wings, expect the tail—which is out of sight—to have it, too, perhaps in a heavier concentration.

Once you start to accumulate ice, don't stay in it. The length of time of your exposure is crucial. If you can get quickly out of it, you'll experience tremendous joy at watching it disappear. If you don't, you could end up carrying that accumulation all the way to the ground—one way or another.

Other Factors

Fronts

Freezing rain below a frontal surface is an ice maker. Rain at the frontal surface is warmer than freezing, but when it falls through air that is below freezing, it becomes supercooled. Supercooled droplets freeze on contact with objects—like airplanes. This can happen with a warm front overrunning a cold front (Figure 2), or when a cold front pushes a warm front up and over (Figure 3). Icing accumulations can be severe because of the large amount of supercooled liquid.

Terrain

Air that blows upslope is cooled adiabatically, and if it is cooled below the freezing point, it becomes supercooled. When stable air blows up a gradual slope, the droplets are small; large drops fall out as rain. Ice accumulation is slow and allows ample time to get out of the icing. Unstable air moving upslope forms convective (cumulus) clouds, which we've already talked about.

Icing is more likely and more hazardous over mountainous terrain. (See October 1995 article, "Ice is Nice.") The vertical cloud formations support large water drops. Frontal movement over mountainous terrain combined with normal upslope airflow create extremely hazardous ice zones—most dangerous above the crests and windward of the ridges. The zone can extend up to 5,000 feet above the mountain tops but can go much higher if cumuliform clouds are present.

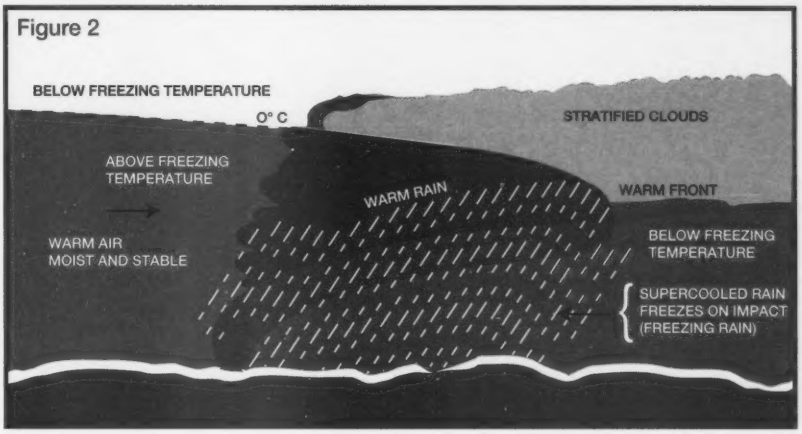
'Tis the Season . . .

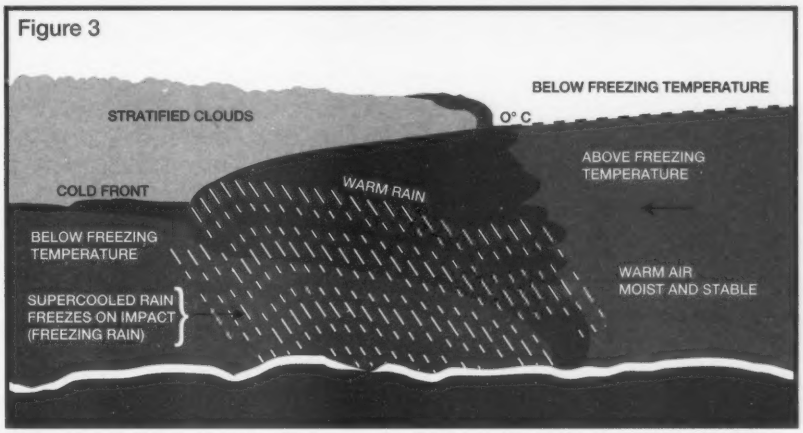
We associate winter with icing, but it can occur in any season. In the winter, freezing levels in clouds are closer to the ground, so light, general aviation aircraft are more vulnerable to icing in winter. Cloud systems containing supercooled water droplets are more extensive in winter, and flight planning around them may be difficult.

Flying in Icing Conditions

After all we've said here, how could we talk about flying in icing conditions?

Well, we don't want you to fly in them, but we also don't want you to





Figures 2 and 3. Freezing rain with a warm front (top) and a cold front (bottom). Rainfall through warm air aloft into subfreezing cold air near the ground. The rain becomes supercooled and freezes on impact.

feel you have to park the airplane between October and March. Careful, conscientious, attentive preflight planning is the key to enjoying winter flying. That, and accepting the idea that there might actually be days in winter that you should not exercise the privileges of your instrument rating in IMC.

Icing—its location, intensity, type, and duration—are virtually unpredictable. The forecast may call for ice, then it never shows up. Or you may encounter ice where you weren't expecting it. Careful attention to weather reports and forecasts, PIREP's, or any other source of weather information is essential in winter time preflight planning—even if you're planning just a short hop to the next airport. (Remember the first accident cited at the beginning of the article?)

If your route of flight takes you into an area where icing may occur, you need to find out from the weather briefer where the moisture is (clouds and what type they are) and what the temperature is aloft. The secret—and it's not so secret—to dealing with ice is to always have an "out;" i.e., somewhere to go to get rid of the ice or get away from it. Depending upon the conditions you have determined from your preflight planning, that may be up or down, a 180 to get to where you just came from and knew there was no ice, a diversion from your planned route of flight into clear air or to a nearby airport short of your intended destination. The key is to stay flexible, don't lock yourself into only one option, and plan to update your weather information through the various methods as you proceed en route.

Departure

You've plotted, planned, talked to flight service, studied weather maps from DUATS, checked the Weather Channel, and you've made the decision to go. We're not going to go into a great deal of detail on preflighting here, because winter preflighting and ground operation are covered in a three-part series called, "The Clean Aircraft Concept." Part One appeared in the October 1995 issue; Part Two is on page 1 of this issue; and Part Three will be in the January/February 1996 issue.

Reminders:

- If your aircraft is equipped with deicing boots, wipe them down with an approved anti-icing fluid to help the boots resist ice accumulation.
- Check your braking action after you leave your parking space and during taxi.
- Before you takeoff, check the aircraft's critical surfaces for any accumulation of ice, snow, or frost. ***Don't takeoff unless the aircraft is clean!***

If your aircraft is equipped with icing protection systems, you can plan to climb through a layer of icing to on-top, but if your climb is delayed by ATC and you begin to pick up ice, let ATC know *immediately*. If you can't get a higher altitude right away, ask for vectors away from traffic in order to climb. Mentioning ice to a controller will usually get his or her attention and you a positive response. If not, you have your FAR § 91.3 emergency authority; be ready to use it.

Quick action is the key to dealing with in-flight icing. You cannot wait until you're so loaded with ice that you may lose control or stall with any reduction of power or change of attitude. Main ice accumulations begin on the leading edges of airfoils, as we said above, but the OAT probe may pick up ice earlier, giving you an indication of what's to come. Such early detection means you can take evasive action with plenty of options still open.

Icing PIREP's

FAA air traffic facilities solicit pilot reports (PIREP's) when bad weather conditions are reported or forecast. They are voluntary on the part of pilots, but their information is extremely helpful to other pilots planning flights. You can give PIREP's to any air traffic facility with which you have contact. EFAS—Enroute Flight Advisory Service—is a collection and dissemination point for PIREP's.

When giving a PIREP, use the following format:

1. Aircraft identification
2. Location
3. Time (UTC)
4. Altitude
5. Type aircraft
6. Sky cover
7. Weather
8. Temperature (OAT)
9. Wind
10. Icing intensity (trace, light, moderate, or severe)
11. Remarks

Example:

From 15 miles north of Beckley VOR to Charleston VOR; Time 1815 UTC; altitude 12,000 feet; type aircraft BE–99; in clouds; rain; temperature -8°C; wind 290 degrees true at 30 knots; light rime icing; encountered moderate mixed icing during climb northwestbound from Roanoke, VA between 8,000 and 10,000 feet at 1750 UTC.

Help a fellow pilot out: Offer ATC an icing PIREP before they ask. Also remember that just because one aircraft flew through an area doesn't mean you can. It might have deicing/anti-icing equipment which you don't.

In Flight

When you just begin to see ice and it accumulates slowly, you have a "trace." Report it as just that to ATC, and make plans to get out of it, unless you have icing protection systems. "Light" icing, remember, requires occasional use of the icing protection system and immediate action to get out of the conditions.

Be alert for any odd vibrations and strange noises if you're picking up ice. Ice build-up on antennas, for example, can cause them to separate, usually noisily and adding to your tension. Don't panic; just accept vibrations and things that go bump in the ice as a sign it's time to get out of there. Remember, fly the aircraft first and foremost.

Hold onto your options: Climb, descend, divert, or land. Don't get into moderate or severe icing, where the only option is down.

Arrival

Even if you successfully climb through a layer of icing conditions and cruise on top, what goes up must come down. If you now have to descend through a freezing level close to the surface, you face the prospect of arriving at your destination iced-up and unable to see out the windows. A majority of icing accidents actually occur during approach and landing because the pilot loses control. Even a trace of ice might warrant coming in hot on the approach (up to a 20% increase in normal approach speed), but plan carefully because a higher approach speed means a longer roll-out on the runway. Make sure you have enough room. After you extend the gear, make your flap extensions and power changes in small increments, to avoid loss of control or stall. You might find you have to open a window and look outside to land.

In Closing

AC 00–6A, *Aviation Weather*, closes its discussion of icing with this summary:

> *"Icing is where you find it. . . . Forecasters can identify regions in which icing is possible. However, they cannot define the precise small pockets in which it occurs. You should plan your flight to avoid those areas where icing probably will be heavier than your aircraft can handle. And you must be prepared to avoid or escape the hazard when encountered en route."*

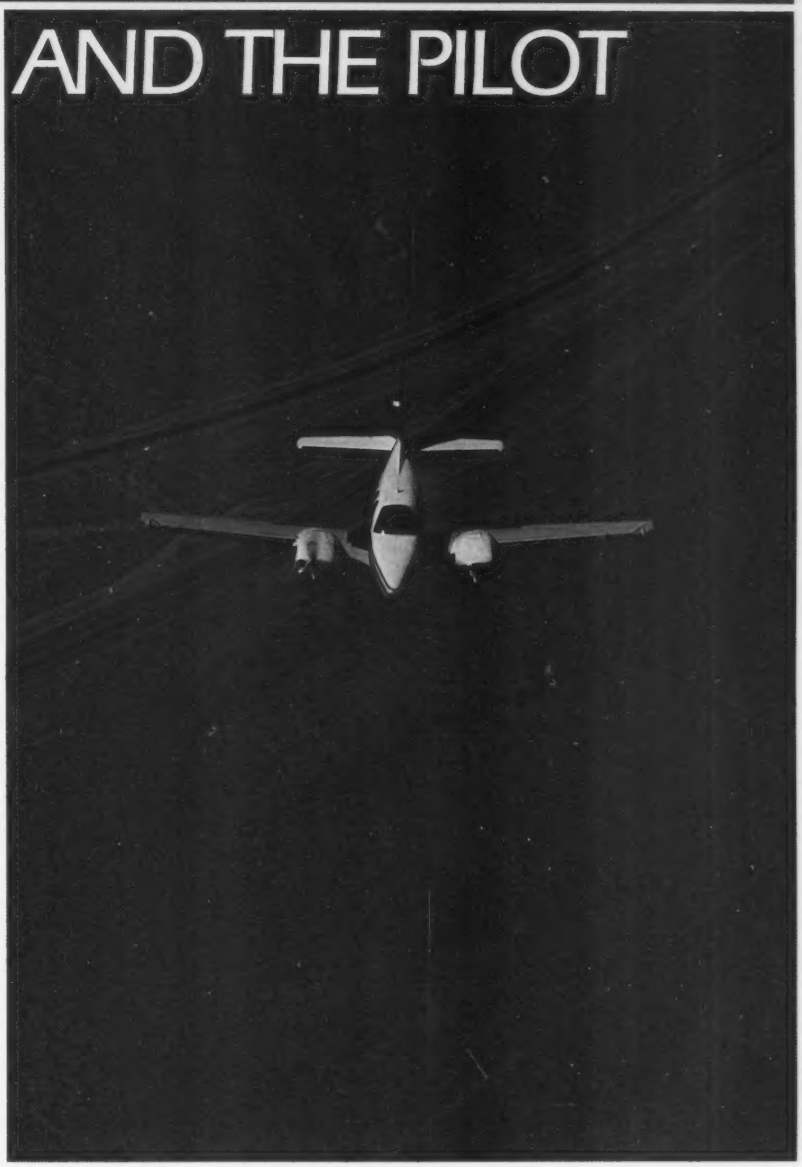
Perhaps we can sum it up simply this way: There is no such thing as a little ice, so *PLAN AHEAD!* ■

You can find additional information on structural, as well as induction icing, in AC 00–6A, Aviation Weather, *and from a safety video entitled, Aircraft Icing. The AC (Stock Number 050–007–00283–1) can be purchased from the Superintendent of Documents, Government Printing Office by calling (202) 512–1800. For information on the video, contact the AOPA Air Safety Foundation at 1–800–638–3101.*

ALCOHOL AND THE PILOT

by Connie Bovier

Pilots who can read this article without uneasiness probably are not among the one in 10 Americans who have or will develop a serious problem with alcohol. But those about to flip the page because the topic doesn't apply should know that a primary characteristic of a problem drinker is denial.



It's funny how the pattern emerges. Often the personal problems appear first: marital troubles, unmanageable kids, finances in a snarl. Maybe there's a lot of sick time or conflicts with coworkers or passengers. Eventually performance starts to erode. And it's all downhill from there.

Today's alcoholic pilot doesn't show up for work drunk. He or she's much too smart and too professional for that. Deep in denial of the disease, the typical active alcoholic "proves" repeatedly that he or she has no problem—exercising iron-willed self-control to follow the eight-hour bottle-to-throttle rule and to arrive in the cockpit technically sober. But he or she's often covering up the lingering effects of a binge and counting the hours or the days until he or she can drink again.

"Mary," a now-sober first officer with a regional airline, remembers the struggle well.

"When I was a flight instructor, I had to schedule students around how I was going to feel in the morning. When I flew freight and passengers for a charter company, I was on a beeper and that was awful. It was tricky to see when I would have time to drink. Sometimes I had to drink when I got home in the morning. I drank whenever I could."

By the time a commuter hired her, the problem was worse. "I remember going to work feeling the alcohol on my breath. I drank on overnights if I had a long one. Then about a year ago I started drinking for as many days as I had off. I might be in bed drunk for three days and would have 24 hours to get myself sober to go back to work."

With six months of sobriety . . . "Mary" said, "I didn't have any idea how far along my alcoholism was or how much it *really did* affect me. My denial kept me drinking for years."

It's accepted today that pilots suffer from alcoholism at about the same rate as the rest of the U.S. population: about one in 10 people. Dr. Gary Kohn, corporate medical director for United Airlines, calls it "an equal opportunity disease." Fortunately, with the present level of alcohol awareness and with alcohol testing . . . yesterday's romantic image of the hard-drinking pilot is no longer hip, slick, or cool. Today recognition, recovery, and return to the cockpit are the watchwords.

It wasn't always so. "In 1970 I showed up at the airport to fly, drunk,"

said Rod C., now retired from a global carrier. "A chief pilot met me at the door and fired me. I was the first pilot in the world to get his job back after losing it due to alcoholism." Luckily for Rod, he was so well-liked by management that his company's medical director walked his case through the federal bureaucracy.

In those days an alcoholic pilot, once discovered, faced automatic medical denial of his certificate. "Airline pilots who had to make a living wouldn't come forward and say they had an alcohol problem," said Dr. Barton Pakull, chief psychiatrist at the FAA's Office of Aviation Medicine. "Not if they'd immediately be denied a medical certificate with a vague promise that *maybe* two years later, they'd be able to get back to flying."

The time was ripe for change. It began at the Air Line Pilots Association in 1973 when an aeromedical adviser told ALPA's board of directors that the second leading cause for loss of license (following cardiovascular disease) was alcoholism. Richard Stone, retired Delta captain and HIMS (Human Intervention and Motivation Study) II program manager, said that ALPA tackled the problem head on, enlisting the aid of equally concerned airlines and the FAA. Their cooperative efforts resulted in a program of identification, treatment, and monitoring for alcoholic pilots. Called HIMS on the airline side and "special issuance" by the FAA, the program has returned more than 1,900 commercial pilots to the cockpit in 20 years of operation. It's so effective that non-ALPA carriers reportedly use the HIMS program as their model. And success—measured by continuous sobriety—runs between 90% and 95%. These are impressive statistics for such an insidious disease.

Dr. Stanley R. Mohler, aviation medical examiner and director of aerospace medicine at the Wright State University School of Medicine, described how alcoholism can affect people who don't understand the potential problems of addiction. "You fall into a pattern of drinking," he said. "Then the excuses start. If something good happens, you drink to celebrate. If something bad happens, you drink to offset that. Alcohol becomes part of your daily existence, and you become known for 'holding your liquor.' But all that means is that you're a budding alcoholic because your body is adapting and your tolerance increasing."

People with a genetic propensity for alcoholism may be alcoholic from the first drink. Addictionologists caution that even those with no family history of the disease can slip into alcoholism. This sometimes happens through ill-advised habits like using alcohol to go to sleep or to fill in the hours during long blocks of time off; other times through environmental conditioning.

Alcohol becomes part of your daily existence, and you become known for 'holding your liquor.'

Jim D. started drinking in the Navy. It wasn't a problem at first, but by 1980, when he flew for a major airline, things changed. "My drinking had progressively gotten worse," he said. "I was hungover sometimes at work, and my performance wasn't what it used to be. I tried to cut down. Then my wife and two of my pilot buddies pulled an intervention on me. It was 'suggested' I go into treatment."

Identification of an alcoholic often requires patience and persistence. The signs don't have to be as obvious as the smell of alcohol on the breath or a DWI/DUI. Some alcoholics drink as often as their flying schedules will permit. Others are "periodics," or binge drinkers. Some drink only beer or wine. Others drink anything, even mouthwash. Some seek out other heavy drinkers. Others drink alone. Some experience blackouts and end up in places they never meant to be. Always, interpersonal problems arise.

A family member, supervisor, or peer may blow the whistle, but it takes more than one or two complaints to justify a confrontation. First-time confrontations can take the form of one pilot in recovery telling a problem drinker about his or her own experience and describing the help that's available. But circumstances may call for a more formal intervention.

Intervention always presents a choice: Stop drinking or surrender your job. That's a powerful motivator. Dr. Richard O. Reinhart, senior AME and medical advisor to FAPA, said, "The threat of having the FAA medical denied because of an alcohol problem is probably the strongest incentive."

Pilots like Jeff Dickerson, Chairman of the Southwest Airlines medical assistance committee agree. "An alcoholic pilot will sacrifice everything," he said, "family, friends, money—everything but the job. The job is the last thing to go. Pilots take a lot of pride in being professionals."

Given such an ultimatum, most pilots opt for treatment. Rod C., who comes out of retirement to help with his company's interventions, said he typically meets with the vice president of flight, the chief pilot, and the pilot with the drinking problem. After management says its piece, Rod tells his personal story. The troubled pilot usually can identify. "If the guy says, 'You're right. I have a problem and want to do something about it,' everybody at the table goes to put an arm around him," Rod said.

Pilots still in denial at this stage likely will do one of two things: Tell the intervention group they can have their jobs, which is unlikely because of the bond pilots have to their jobs, or they will try to save their jobs by grudgingly submitting to evaluation and treatment. In the second scenario, pilots typically dislike going to Alcoholics Anonymous meetings; eventually, if these pilots don't give in to their denial, they probably will return to drinking.

After identification, a pilot undergoes a complete medical and psychologi-

cal/psychiatric evaluation to determine that he or she is, indeed, an alcoholic. According to the FAA, drugs represent a very small percentage of addiction problems. [Dr. Audie W.] Davis said only about 100 of the 1,900 pilots who've been granted special issuance were involved with drugs. Among those, less than 10 were primarily drug-dependent. "In the military and the pilot cultures, drinking was the thing," he said. "Drugs are against the pilot image." Even given the higher drug usage during and after the Vietnam era, the diagnosis usually was alcoholism.

Dr. Larry Wharton, medical director of the chemical dependency unit at Columbia Behavioral Center and psychiatric consultant to the FAA, said, "My personal opinion is that addiction is addiction. It just depends on the drug of choice. If a cocaine addict were to quit cocaine and try to drink socially, he'd be an instant alcoholic. This is accepted among most addictionologists."

Once a pilot is diagnosed he or she goes into four weeks of inpatient treatment at an FAA-approved facility. Insurance usually covers the cost of this at big carriers. There also may be a provision on alcohol treatment in pilots' labor contracts. Prescribed aftercare generally includes visits to the treatment center, and regular attendance—usually 90 meetings in 90 days—at AA meetings, although AA doesn't require this. Within a few months, most pilots return to work, where they're closely monitored (including weekly meetings with a designated sponsor) for a minimum of two years.

Airlines with established alcohol programs try to foster an environment of trust. John Fallon, employee assistance representative for pilots at American Airlines, works hand-in-hand with the Allied Pilots Association (APA), which refers pilots to the Employee Assistance Program for treatment. APA aeromedical committee chairman Allen Hill said his committee is composed of four pilots at the national level and one pilot representing each domicile who work to bring alcoholics into recovery.

At United, an employee assistance committee at each domicile includes representatives from the medical department, flight management, and ALPA. These committees identify and refer alcoholics for treatment and monitor aftercare. Kohn said, "We've had our program for about 15 years, so there are a lot of recovering pilots who've been there and done it all. They can take a new guy under their wing."

At Southwest Airlines, Dickinson heads up a program modeled after HIMS that he describes as an autonomous unit of pilots using peer pressure to get a troubled pilot out of the cockpit, put them in rehab, and bring them back to the line—all before something serious occurs. "The way our program is set up, it assumes you're coming back to flying. The only way you won't is if you don't want to." He points out that recovering pilots typically become dedicated employees for their companies. "And it's economically a good thing because an airline invests a lot of money in hiring and training."

AA meetings are easy to find, even for pilots always on the road,. . .

While most pilots are OK'd to return to flying within three to six months, that's not a given. "We examine them carefully," Pakull said. He reviews reports on each alcoholic from an FAA-designated psychiatrist, an AME, a chief pilot or supervisor, a peer sponsor and an aftercare therapist to determine if the individual is in good enough recovery to warrant a special issuance. "Or, do we need to ask for more information or watch his sobriety until we feel more comfortable?"

Pakull's recommendations to the Federal Air Surgeon are forwarded to Dr. Audie W. Davis, manager of the FAA Aeromedical Certification Division in Oklahoma City. Davis, who oversees special issuances and monitoring programs, explained that a diagnosis of alcoholism never appears on a pilot's certificate. (Nor can anyone, even potential employers, access FAA medical records without a pilot's permission.) A special issuance [or waiver of regulation] actually is a letter to the airman, returning him or her to flying status providing he or she follows specific steps for aftercare.

Throughout the monitoring period, which lasts a minimum of two years, recovering pilots constantly are encouraged and closely watched. While the FAA doesn't mandate AA attendance (it considers other programs *if* they espouse complete abstinence from alcohol), it strongly urges participation because of the quality of sobriety active AA's often attain. Aside from AA meetings open to people from all walks of life, some recovering pilots attend "Birds of a Feather," an AA-based fellowship for pilots and aviation personnel with meetings in most major cities and airline hubs. To contact Birds of a Feather, write or call: Fritz Graf, BOAF International, Secretary, 5508 Winford Court, Fairfax, VA 22032; phone: (703) 425–1723.

Wharton, who's monitored recovering alcoholics since 1974, said, "I've seen about 160 pilots going through the special issuance process, and I look for their involvement with AA—whether a pilot's identified a home group, whether he or she's got a sponsor, how much sobriety that sponsor has and where he or she is in a 12-step work with that sponsor. The only common thread I can find in relapse is that those people quit going to AA meetings." AA meetings are easy to find, even for pilots always on the road, so there is little excuse for pilots who want to attend these meetings.

For those who do relapse, treatment is available a second, even a third time. The FAA is cautious to set no limits on recovery, taking each case on individual merit, to avoid driving "slippers" underground. Although no U.S. commercial aircraft accident has been attributed to alcohol use by a crew, locating and

treating problem drinkers has undeniable implications for operational safety. And as Denis R., a regional pilot with 25 years' sobriety pointed out, "I'm a lot safer pilot than a social drinker. I never show up to work hungover. And the company doesn't have to worry about me drinking on layovers or taking barbiturates to sleep."

Most recovering pilots stay on track by close peer monitoring. The typical pilot assistance committee includes nonalcoholics and those in recovery (two years of sobriety is a common requirement). Tom McCracken, chairman of the Delta Pilots' Assistance Committee in Dallas, said his committee also includes people in related 12-step programs, Al-Anon Family Groups, and Adult Children of Alcoholics. Sober alcoholics and others who understand the disease can spot problems like denial and *submission* (versus *surrender*) to the recovery process. "It's fairly easy to pull the wool over my eyes," said American's Hill. "So when I run into a problem, I call one of the guys on the committee who's in recovery. They know all the tricks."

While most sober pilots welcome the changes the AA 12 steps bring about in their lives, McCracken said some are stubbornly resistant. He tells of one global airline pilot who was monitored for *seven years* because he fought everything. "He'd show up at AA and say, "I'm at this meeting only because I *have* to be here."

Other sober pilots fall away from AA when their monitoring period is over. "The 'white knuckle' guys are really negative," McCracken said. "They continue to have living problems—with the wife and kids—or go through marriages. Whatever there is to complain about, they're complaining. They still have the super ego, the 'I'm-right-you're-wrong' attitude, the chip on their shoulders. Here's this guy flying an L–1011 internationally, making $200,000 a year and hating the world. The pilots working the AA recovery program are in a much better state of mind. They're trying to work through their problems." Regrettably, many of these *dry* (versus contentedly sober) alcoholics return to drinking after retirement. "If the wallet was keeping them sober," said McCracken, "once they retire, there's no hold on them. They can get 10 DWI's and it won't affect their retirement pay."

What about pilots who deal with an alcohol problem quietly, on their own? Those who undergo formal medical treatment for alcoholism must, by law, tell the FAA. With sober AA's it's a matter of conscience. Pakull said it takes a medical diagnosis of alcoholism to trigger an FAA reaction. "If a pilot says he's been going to AA and hasn't had a drop to drink for 10 years, the FAA will say 'that's great, keep up the good work.'"

Denial of the real problem did no one any good . . .

Davis agrees. "We encourage people to come forward and be honest about it rather than keeping it underground," he said. "In the AA program you're an alcoholic if you say you are. If you've made your own diagnosis, the FAA has nothing to stand on. You haven't falsified records if you've never been through treatment."

He added that he doesn't know of any case in which the FAA has taken action against a certificate when the pilot has self-reported it. He elaborated: "If a pilot has more than two years of sobriety, his or her certificate will probably stay the same. We'd place a new person with less than two years sobriety under special issuance and shorten the time for follow-up. Some people may fuss that we're not being the hard old FAA we should be. But we look at the individual case." [Sober AA's who want to clear up the past may contact Dr. Audie Davis directly at (405) 954–4819.] However, a pilot's FAA record is cleared *only* by a court order.

What should you do if you or someone you know is a problem drinker? Contact someone trained in pilot alcoholism—whether in management, the pilot union, or with the FAA. Don't cover up for a friend. And *don't* assume someone else will take care of it.

"We have a couple of pilots we know have problems," said one pilot assistance committee chairman. "And the company knows. But we don't have enough on them for intervention. Pilots like this can be out there flying sober. An international pilot, who works seven days and is off for 13, can stay drunk for 10 days, sober up for three, and pass any alcohol test in the world."

The ongoing challenge today is to increase understanding of alcoholism at all levels throughout the industry. Steve S.'s story is a cautionary tale.

"I started drinking at 15 and learned to fly at 16," he said. "And I was a juvenile delinquent by 17. I shot down a military career and an athletic career and drank myself out of a college degree. Later I was fired from three flying jobs—by two [FAR] Part 135 operators and a commuter. But no one ever fired me for my drinking. There were always other excuses, like a failed checkride."

Denial of the real problem did no one any good, least of all Steve. By the time he sobered up in AA 11 years ago, he claims he was "blackballed" from aviation and desperate. After supporting himself for 18 months with odd jobs like waiting tables and mowing yards, he began the long climb back to the cockpit. Now a first officer for a major airline, he said, "Drinking and drugging probably cost me at least a million dollars in pension and a couple of million in salary. I'm about 10 years behind my peers. But by the grace of God," he added, "today I'm back in aviation and at an airline." ■

Ms. Bovier is a Houston-based aviation writer.

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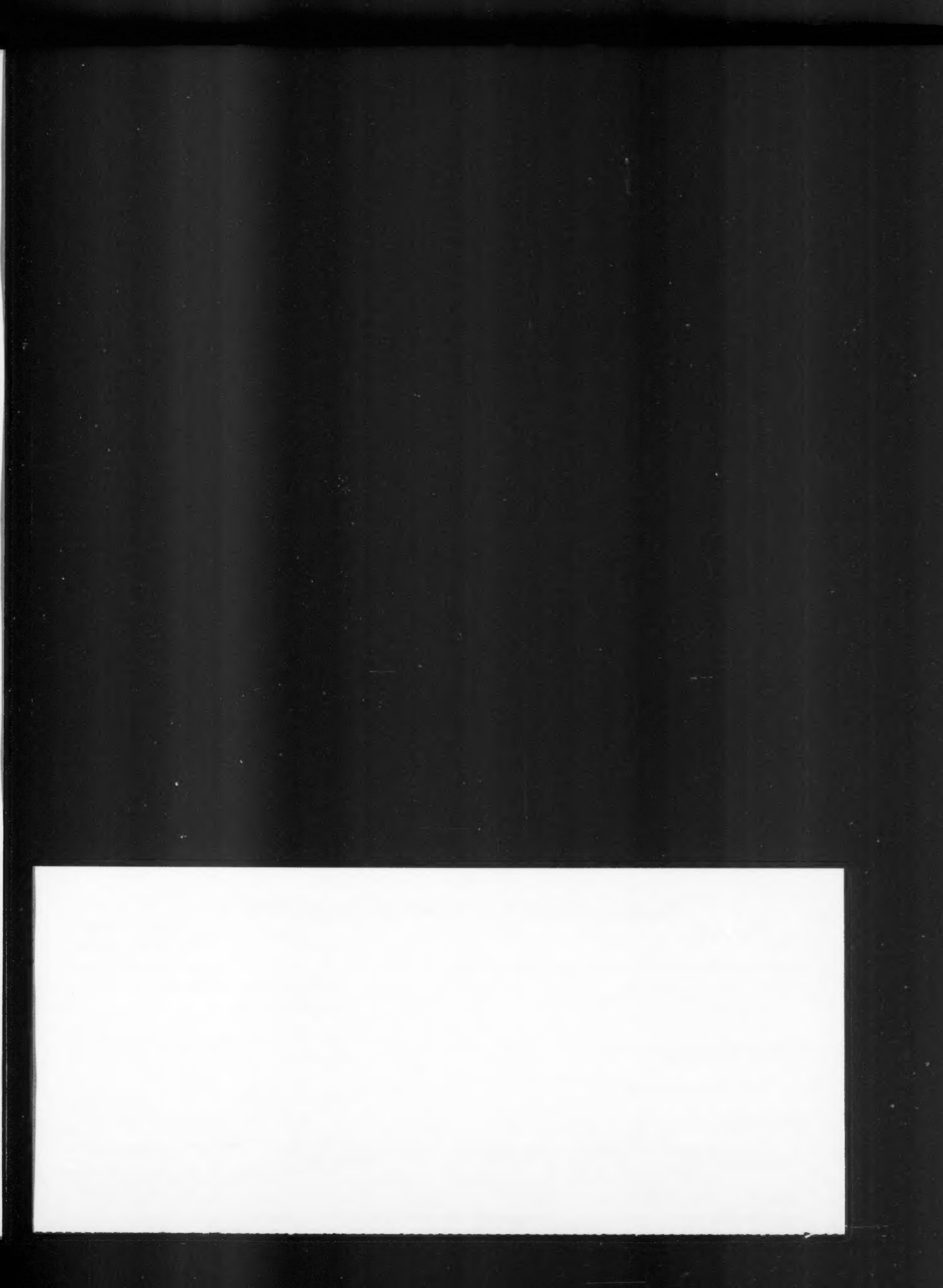

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AGARS

by Robert E. Blanchard, PhD

M. Harvey

A view from inside the new AGARS—Advanced General Aviation Research Simulator—now fully operational at CAMI.

The Civil Aeromedical Institute (CAMI) now has an advanced general aviation research simulator (AGARS) to support the Federal Aviation Administration's general aviation human factors research program.

This high-fidelity, reconfigurable, flight deck simulator will represent complex interactions of environment, hardware, communications, crew resource management, situational and risk variables in simulated general aviation flight protocols.

AGARS provides dynamic control response; the initial emphasis is on single pilot, high-performance, pressurized, single-engine aircraft. The simulator's design allows it to be quickly reconfigured for multi-engine and multi-crew applications, such as a turboprop or business jet.

The simulator is equipped with a high-fidelity visual system with a 150 degree-wide field-of-view, capable of both day- and nighttime views, with taxiway and full weather and ground environment control. The visual system also permits variations in runway lighting, airport and terrain characteristics, and atmospheric conditions, all of which can influence the pilot's decision making and flight performance while enroute and during visual approach and landing maneuvers.

The visual data base currently provides for line-oriented flight from Oklahoma City to Albuquerque, NM, via Amarillo, TX. All intervening airports are provided within a 30-nautical mile band of US Interstate-40. Highly accurate terrain and cultural information is provided for the three major airports, as well as for Oakland International at Oakland, CA, which can be used when overwater approaches are desired.

Computer software and visual data bases allow a broad range of flight profiles to be investigated, including nonroutine events.

Weather conditions can be varied at selected altitudes, from clear through varying stages of declining visibility to instrument meteorological conditions.

Cockpit panels and consoles are quickly reconfigurable to support human factors studies or current aircraft displays, as well as testing various innovative display/control layouts, functional groupings and information display architectures conceived for future GA cockpit systems.

Classes of aircraft and aircraft systems that may be simulated through reconfiguration include:

- Class I: Non-complex aircraft (Cessna 172 *Skyhawk* currently available)
- Class II: High performance, complex, single engine aircraft with pressurization (Piper PA–46 *Malibu* currently available)
- Class III: Twin engine reciprocating or turbo-prop aircraft
- Class IV: Turbojet aircraft (*Learjet 35;* Cessna *Citation V*)
- Class V: Advanced GA Aircraft Cockpit Concepts. Innovative glass cockpit displays, controls, sensors, system integration, software, communications, and navigation (available and planned for use with the joint NASA/FAA Advanced General Aviation Transport Experiments (AGATE) program)

Data capture capabilities allow recording of flight data to obtain objective measures of a broad range of pilot/crew performance measures. Included are high-fidelity digital flight data recording, cockpit voice recording to support voice analysis, cockpit video recording, eye-tracking, and psychophysiological data recording. The data collection system has the capacity to collect a minimum of 150 variables for a four-hour mission.

In addition to a fully equipped experimenter operator's console, AGARS has an air traffic control workstation, a pseudo vehicle operator's workstation, and other positions to provide realistic simulations.

AGARS can also interface with other simulators, either at CAMI or located elsewhere, to permit joint simulation of major FAA research projects.

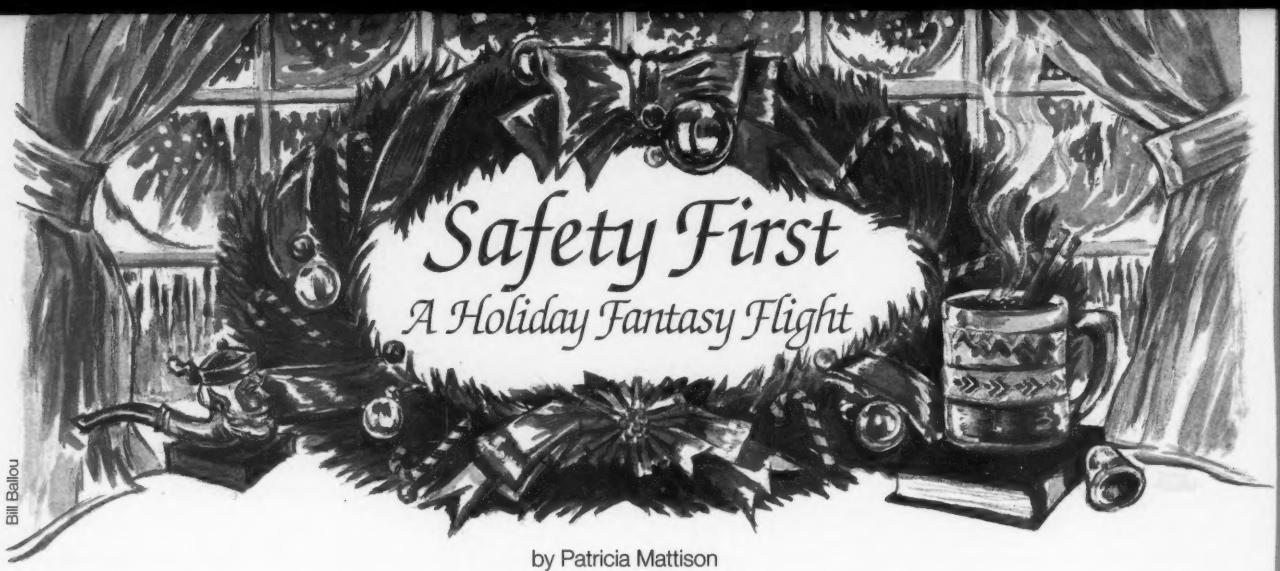
Continued on page 20

Advantages of Using Advanced Simulator

- Research can be performed to various performance standards—without jeopardizing safety.
- Ensures technological advances are consistent with capabilities of general aviation pilots to assimilate new technology.
- Provides guidance on the most safe, cost-effective of innovative control and displays available to general aviation fleet (plethora of gadgets are available—which are the most useful, practical, and cost effective?).

Human Factors Studies Being Considered for AGARS

- Effects of fatigue during long flights across several time zones (disrupted circadian rhythm).
- Tests of innovative procedures, displays, and applications.
- Safety and efficiency options of new controls and displays being introduced to the flight deck.



Bill Ballou

by Patricia Mattison

'Twas *the night before the night before Christmas, and a man in the far north was dreaming . . .*

"Brrrrr! It's cold out there," the man said as he stomped in the door. He left a pile of snow on the rug that would eventually melt into a puddle. "I'm about ready to go," he said, "and I'm late as it is." Smiling, he looked at his wife.

"Did you check the weather forecast," she inquired. "It surely would be a shame if you were not able to make those deliveries."

The man took off his fur coat and shook off the snow before he sat down heavily in his favorite chair. He was tired, but he knew he still had a long night ahead of him.

"I checked the weather this morning, and it's supposed to be clear along my entire route of flight, but I guess another look wouldn't be a bad idea." He was concerned about IFR conditions. He knew he could fly IFR, but his equipment was old and not certified to fly IFR.

While he dialed the phone, he thought of all the trips he had made in the past with no problems—clear weather, and on the best trips, a full moon to light the way. The briefer answered, "Flight Service. Go ahead with your request."

"Yes, sir, I'd like a full weather briefing," he replied, giving his route of flight, the type of aircraft, his N-number (N1225S), and the proposed altitude. The briefer told him that the weather was forecast to be clear with the exception of a small town in Utah. The pilot asked if the weather would clear before midnight, and the briefer said he thought it would. With that, the pilot filed his long flight plan and hurried off to finish loading for his trip.

He was very careful to remain within the weight and balance limitations allowed for his aircraft. His "Mrs." came out to help along with some of his ground crew. "Do you think that you'll be needing another wrap? It's so cold, my dear, and you aren't as young as you used to be," his wife said. "I worry so when you take these long trips."

"I'll be fine," he replied, "after all, I've been doing this forever, and I've always come home to you, haven't I?" She nodded her gray head slowly, and then she smiled, thinking of the good his trip would bring.

"Let's see, have I forgotten anything?" he mused, looking around. "No, I guess not." With that he kissed his wife, gave her a reassuring hug, and with a nod of his head, he was off.

The fact that he was really late this trip crossed his mind as he flew along through the clear, cold air. He knew he would have to find the most favorable winds to help his ground speed along. He climbed and climbed to an altitude where the winds were strong and steady, just as predicted. "There, that's better. With this wind the trip east will be a snap." He began to sing as he monitored his equipment.

The first delivery was easy enough. Just a few small items and off to the next stop. On through the night he flew, working hard to complete his rounds.

Turning back to the west, he noticed that his ground speed was decreasing. He radioed Flight Service to get the current weather and to update his flight plan. He was getting further behind. He thought, "I can get this job done if I can just get a little more speed out of this old aircraft. I'll fly a little lower and see if I can get rid of some of this headwind." As he descended, he was mindful of the terrain below. Reviewing his charts, he saw that his route of flight would take him over some high mountains where radar coverage was sketchy. He decided to level off at 16,000 feet.

Night was just beginning to give way to dawn when he arrived at the small town in Utah. The weather that was supposed to have cleared was still there. The gray blue of night was just beginning to dissolve into the pink dawn of another day. "My last stop, and wouldn't you know it—the town is socked in." He was dismayed. He had never missed this town before, and he was not about to disappoint a special little person now.

As he held above the sleeping town, he thought of the wonders he had seen through the years. The advancements over the past century never ceased to amaze him. Medicine had developed the ability to reduce disease and pain and suffering. Technology allowed people to have more free time. Advances in aviation technology made travel easier—and what about those satellite systems for

communication and navigation? The wonders were too numerous to recall.

Yet, human beings were still cruel to one another. Love, the most important emotion of all, was reserved for family; yet, sometimes even family did not receive love. It was sad to see how far the world had gone forward in some ways and backward in the most important way of all. He had to make this last delivery. He just had to.

The new day was coming fast, too fast, and as he looked down he saw that a hole had opened up over his last stop. "With a little luck, I can make it through," he thought. He was beginning to get desperate, and he knew it. "Should I risk it? I could get into real difficulty if that hole closes up, and I go IFR." He decided to hold until the very last minute before full dawn. The sky grew ever pinker, then finally, "There! A clearing! What a break!" Down he went to the last house on the furthest block on the outskirts of town.

His landing was flawless, as usual. "My landings are getting too good," he thought to himself. "I had better watch it. I might get complacent. I don't need an accident now that I'm almost through with my route."

As he entered the house carrying the very important package, he thought he saw somebody move near the stairs. He glanced over his shoulder as he was about to place his delivery on the hearth. The small, soft, brown puppy in his hands yipped, and he heard a gasp and footsteps behind him. Turning around he saw a small child, with eyes wide, staring at him. The boy held a Teddy Bear in one small hand; the other covered his mouth in amazement.

Placing his index finger to his lips, the delivery man looked at the boy and with a smile handed him the squirming puppy. "What will you name him?" the bearded man asked in a whisper.

"I'll name him Love because that's what Christmas is all about," said the boy, as the puppy wagged his short tail and licked happy kisses all over the boy's smiling face.

With his deliveries complete, Santa left on the last leg of his long journey. He had another safe trip under his broad black belt. He had followed the regulations, listened to his conscience and judgement about that sucker hole, and completed the trip safely. He knew a lot depended on his yearly trip, and now he was on his way home. Home to his wife who worried about him. Home to enjoy the meaning of this holiday season.

Santa woke with a contented sigh after his dream of last year's trip—successful, albeit hurried. This year, well, this year was a different matter.

"Gunther, Elias, Samuel, all of you, come here," shouted Santa. "Only 24 hours until I leave, and the parts I ordered aren't here, much less on the sleigh. What do you propose to do about this situation?"

The sleigh's right runner was worn beyond specifications, a bracket attachment to the team's harness was broken, and the electrical system was down until the alternator could be repaired. Least of all the worries was the outdated radios, the problem that had plagued him the year before.

Gunther was the head elf, and, as such, he was responsible for the final mechanical inspection of the sleigh before Santa left on Christmas Eve. "I tried to get the parts you ordered, sir," he said, "but they were back ordered. The company sent the next best thing, but the parts aren't FAA certified. I'm not sure we can use them legally."

A conundrum for sure. That he had to make the trip was a given, and, of course, the schedule was inflexible. But what would people think if Santa got caught violating the FAR concerning suspected unapproved parts? Suddenly, Santa had an idea.

"Why didn't I think of this before? Samuel, I have an assignment for you. Take a quick trip to Russia and see if the Snow Queen has any spare parts we can borrow until I get mine. She has the same model sleigh I do."

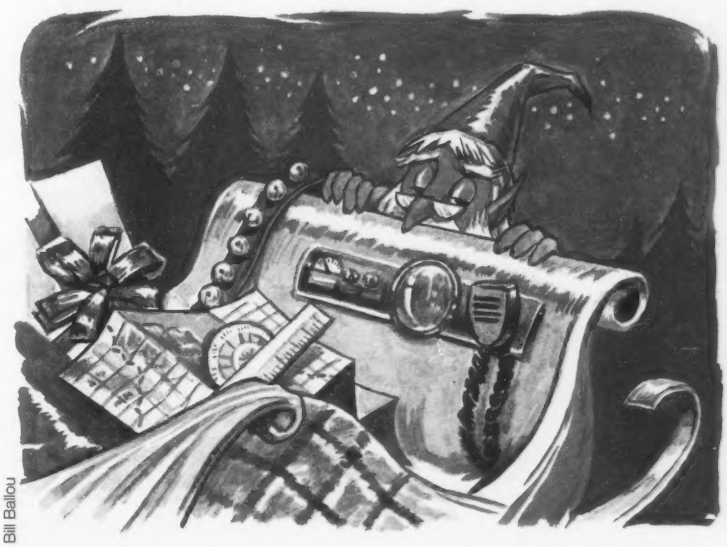
"Good idea, Santa," said Samuel, and off he went.

All things being magical at the North Pole, Samuel was back in the bat of a reindeer's eye. "Success, Santa!" he said. "The Snow Queen had that bracket you need and an older working alternator off the sleigh she had a few years ago."

Relaxing, Santa said, "How can I ever repay her?"

"It's okay," said Samuel, "she said she'd see you and Mrs. Claus at the New Year's party."

Two down and one to go. That right runner worried Santa. If it were to break on landing, there would be some serious injuries. They had a part—a new one it seemed, but he wasn't sure the certification numbers were where they should be. He'd ask Gunther to check with the FAA.



Bill Ballou

"Elias," a frustrated Gunther shouted, "call the FAA airworthiness inspector and check on the runner Parts Manufacturing Authorization number. Then ask if we can use this new part or if the old one will do for one more trip."

Elias returned from his call to report that, "The runner was in the English Swan Queen's inventory and had been manufactured well before the FAA was around. The inspector said she would be right over to inspect the part. She said she knows how important it is this time of year." Gunther smiled and thought, "Those dedicated public servants!"

True to her word, the inspector arrived with time to spare. She looked at the runner and said, "This part has an old serial number on it. I'll see if it corresponds to the information I have. Yep, it's a good one. Go ahead and use it, but be sure to enter the replacement in the sleigh's logbook. Is there anything else I can do for you?"

"Would you be able to stay for a while and look over the logbooks to see if there is anything else I need to do before tomorrow night?" Santa asked the Inspector.

"I'll go one better," the Inspector said. "Let me call my Operators Inspector buddy. We'll give you a Pilot and Aircraft Courtesy Evaluation—you know, check your certificates and sleigh, and my buddy will take a ride around the patch with you, Santa. How about that? That way, you'd be assured everything is in order."

"You'd take time out of your busy schedule to do that?" Santa asked.

"It's part of what I do for the FAA," she replied.

Later that day, Gunther arrived at Santa's door. "I've fixed the radio. It was a bad squelch. I also had the navigation radios checked, and I entered it all in the logbook. Your sleigh is IFR ready, and the new parts are all installed. Logbook entries complete. You're ready to go."

The Inspectors looked over the logbooks and certificates, and Santa went for his courtesy flight check.

"Everything is just perfect," the Inspector said. "Of course, what else can I expect from Santa Claus." The inspectors waved goodbye and called to Santa to have a good trip.

Santa, his worries behind him, went to bed smiling that night. He knew nobody would be disappointed this year. All the gifts would be delivered on time, even if he had to fly in IFR weather, and he'd be flying in compliance with the FAR.

A good feeling. A very good feeling. ■

Ms. Mattison is an Aviation Safety Inspector and Safety Program Manager in the Juneau, Alaska FAA Flight Standards District Office. Versions of this story appeared in two parts over two years in the Juneau Times.

Bill Ballou

The Communications of Instruction

by Bill Cuccinello

"The receiver doesn't always receive what the sender sends."

That line is one of the basic tenets to all communications. Dependent upon a person's knowledge or background, the person receiving the information does not always interpret the information as it was transmitted. As an example, you may tell a person you love the color green in a car. That person (mentally) practically regurgitates, thinking you mean a bilious color green which the person abhors. You in reality are thinking of an aqua color green that the person really loves, but he or she associates that color with blue.

In teaching we face similar problems. Unfortunately, as our instructing years pass, we may become more complacent in our explanations of certain flight characteristics, thus not taking the time to properly lay the correct groundwork for the next task at hand.

Think about the time you first learned to fly and the instructor said, "During our next lesson we're going to practice stalls." You went home and told someone, "We're going to do stalls next time I go up." Remember that someone's reaction. "What? You're going to fly without an engine?" Obviously, that someone thought you were two eggs short of a dozen.

That is why it is so important that we properly explain to the student what we are about to do and especially WHY. And during the *why* is when we explain the reasons. Simply saying to a student, "You're coming in too hot," or "You're not giving it enough power," or "Push the throttle forward" is not enough. Be definitive. If you say, "Push the throttle forward," add the amount of RPM's you want; i.e. "Push the throttle forward to 2200 RPM's." Later on the ground, you explain why you used 2200, rather than 1800 or 2500 RPM's.

In addition to stalls, other terms that require clearer definitions are V speeds, controllable speed props, attitude control, flying by the numbers, more rudder, stabilized approach, and we could go on and on. Depending upon the student's training phase, we should explain the reason for "more rudder" or why we recycle the prop during the runup. Because a student may be involved in the Commercial or Instrument phase, we automatically assume he/she understands the reason for obeying our instructions. But this is not always so. We should not only attempt to thoroughly explain our reasons for the instruction, but we should ask the student to repeat the explanation back to us.

Oftentimes, we must also go that extra step to get the message across. If the student cannot grasp a certain function have another instructor try teaching the student the same maneuver. If the student still has a problem do some research.

Is the student learning disabled in some particular phase? If so, talk to experts in that field. Perhaps they can advise you as to how to correct the situation. Or maybe the student has other problems that he/she may not recognize such as poor reading skills, eyesight problems, inability to concentrate, etc. Whatever the problem, as the instructor you owe it to your student to properly train that student to become a good, safe pilot. I realize of course, that time and money limitations may curtail the amount of research you can contribute to the situation, but you should "give it your best shot." After all, who knows what the research may uncover?

G. S. Livack

In one of my past lives I ran an advertising agency. I remember that whenever we developed new campaigns for our clients' products, we always had trouble convincing male clients to use the color green in their ads. In one particular instance, after the campaign was developed, the artist had used a bright green color for the layouts. After reviewing the layouts, I suggested to the artist we change the color green to blue, since male clients seemed to turn down green ads. Of course the artist being a temperamental, creative type began screaming about his artistic integrity and that he had designed these ads with the color green and no other color in the whole wide world would carry the same effect and if I changed the color the campaign would be a disaster. The products would not sell, the company would file bankruptcy, the entire economy would disintegrate, the nation would be in turmoil, and the result would be disease and pestilence throughout the world.

Well, I told him I had considered all that, but in the end I knew the client would not accept the green ads so the color will be changed to blue. However, I agreed to offer him one concession. I would have him accompany me to the client's presentation and he would present the green ads personally. If the client did not agree to the green ads, he would then show the blue ads. He agreed.

At the client's office the campaign went "swimmingly well." The client loved the research, ideas, and strategy developed from the demographics, but when he saw the green ads, he turned several different colors as he screamed a number of choice expletives with the statement, "I never want to see that bilious green again," and then went into more expletives to describe the color. "Give me any color except that bilious green," he yelled!

The artist could not believe his eyes. When he showed the same ads in blue the client calmed down and began raving about the ads, the artwork, etc., and praised the artist beyond expectations for his creative ability.

Upon leaving the client's office, we discussed this strong aversion to green which in those days many male clients seemed to abhor. We decided to research the problem.

We found that in the days of kings, queens, and knights, the Executioner Knight always wore green. We had always associated black with Executioner Knights just as we do today. But not so. Our research told us Executioner Knights were always dressed in green. Could this have had any influence on some men hating green?

Conversations with people from the medical and psychiatric communities explained to us there could be a relationship, that certain shades of green could have been carried down through generations of men through their genes, thus invoking a fear of that particular shade of green.

How possible is this? We could never prove it, and probably never will. But the point is . . . had we never performed the research, we would never have run across this interesting fact. From that time on we dispensed with that particular shade of green in layouts, saving us considerable time and effort in presentations.

And so in teaching your student, remember communications is the key to training. If you and the student completely understand each other the training program will be much more effective. But above all, you must question your student to be certain he or she understands why they are performing certain rituals.

Finally, if your student runs into a learning plateau, find out why. If another instructor cannot correct the student's deficiency, start researching the student's problem. Who knows what you might uncover? In the end you will certainly benefit from the research. You will probably find information that will help you with other students or even your next game of trivia. ■

Bill Cuccinello is a CFII, an Aviation Safety Counselor, and the editor of the FSDO 1 Communicator. This article originally appeared in his column, "The Flying Guru," where he shares his insights as an instructor.

AGARS

Continued from page 15

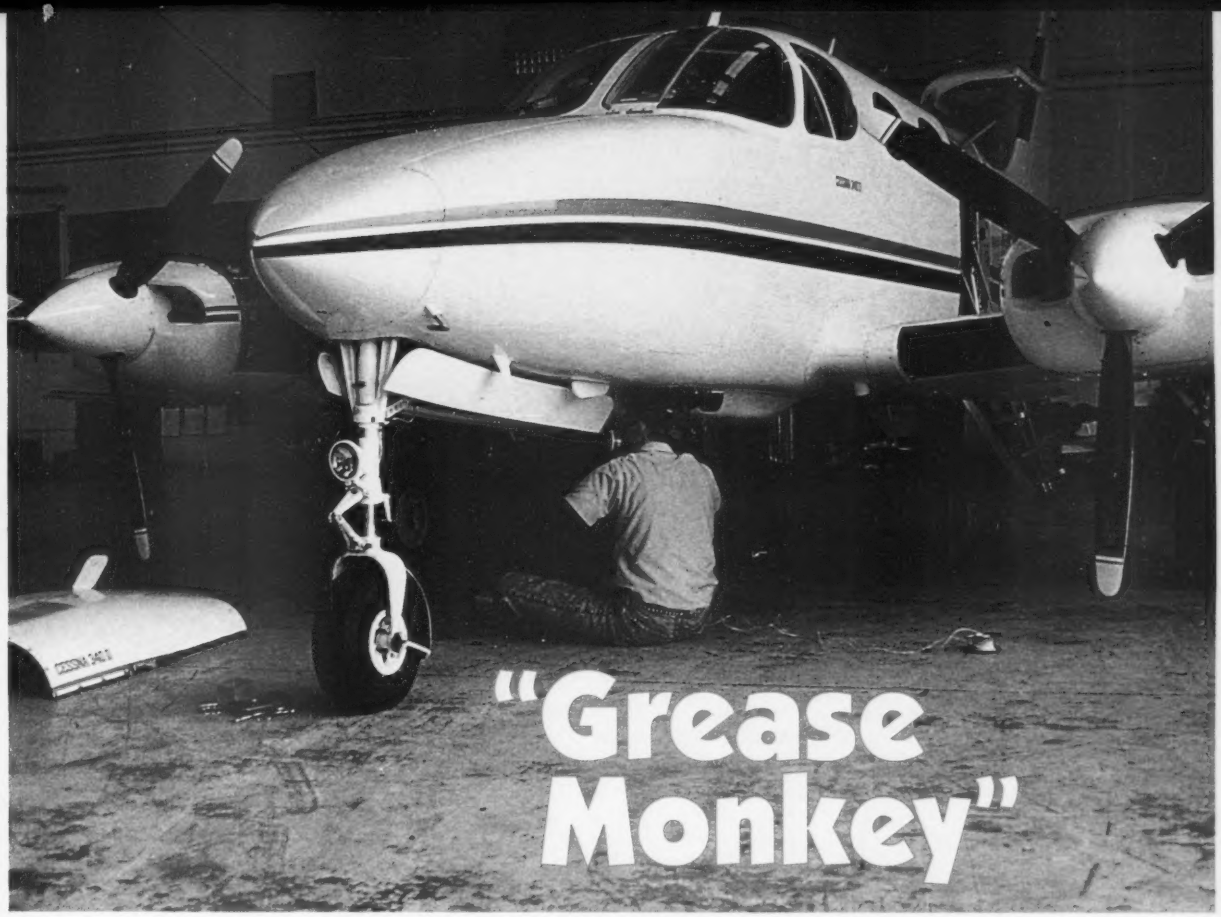
AGARS studies to be conducted in FY'95–FY'96 include:

- Identification and test of criteria for certifying autopilot/autotrim systems (Class II Aircraft; Piper *Malibu*),
- Performance implications of advanced navigation and weather display concepts (Class I Aircraft; Cessna C–172),
- Pilot fatigue in complex, single engine, pressurized aircraft (Class II Aircraft; Piper *Malibu*), and
- Integrated, multi-function, glass-cockpit display research in support of the AGATE program (Class V aircraft configuration).

AGARS will greatly increase the flight simulation capability previously provided by the personal computer-based basic general aviation research simulator, both of which are located at the CAMI Human Factors Research Laboratory's flight simulation facility.

The CAMI flight simulation facility is available for joint aviation research projects with other government agencies and the private sector. ■

Robert E. Blanchard manages the Human Factors Research Laboratory at CAMI.



"Grease Monkey"

by Bill O'Brien, *Aviation Safety Inspector, Airworthiness*

It was a bitter cold Monday morning in late November. The wind was blowing out of the southwest at 15 knots gusting to 20. The sunrise was barely an hour old, a faint reddish orb in the eastern sky, offering a pale light but no heat. Instinctively, everyone knew that today was the day the sun would lose its right to warm the concrete ramp at Dulles Airport for the next three months, surrendering it unconditionally to winter's chill.

The Beech 1900 commuter aircraft was parked at the far side of the ramp with the left engine cowling opened. On top of a metal work stand, a lone figure, his back hunched in an attempt to shield his hands from the cold wind, was working to change the PT–6 igniter box.

Replacing the igniter box is usually an easy repair. One which the aircraft mechanic now working on the engine must have changed many times before. But today the job was made difficult, more time consuming, by the cold wind and stiff fingers. Fingers that sometimes stuck painfully to the cold soaked metal of the engine's turbine housing.

I stood inside, alone, looking out the window of the commuter airline's combination operations and maintenance office, watching the mechanic work at the same time nursing a cup of vending machine coffee. After a long while, I took another sip of coffee, cradled the warm cup in both my hands and looked down at my own dark reflection in the bottom of the cup and remembered.

I remembered another time, another career, when I was standing on a cold metal work stand at another airport, fighting the same weather, working on similar airplanes with similar problems, feeling the identical pressures to meet a deadline. In the cup I saw my brilliant successes—meeting the gate, saving the day, and basking in the 15 minute spotlight of fame and glory—and I also recalled the sack cloth and ashes of verbal abuse from my peers that my dismal failures handed me. But most of all I remember the burden of responsibility that I and every other aircraft mechanic carries. Simply put, the lives of everyone who climbs aboard the aircraft depends on the mechanic's ability, judgement, and skill to make an airworthy repair. A mechanic must be 99.9% right all the time. He or she is not allowed a margin for error, no second chances, and no excuses for failure even if the wind chill factor was five below zero and passengers are waiting.

"Why the hell is he taking so long!" the co-pilot said to no one in particular. My eyes found him as he paced back and forth in front of the dispatchers desk. He was a very young 25, and yet he had almost 3,200 hours in turbine powered aircraft. He was tall, profes-

sional, confident, with a little touch of arrogance that comes with youth and dark sunglasses.

I had introduced myself to both the co-pilot and the captain an hour and a half earlier and shown them my FAA ID. As expected, I received the cool, professional, "welcome aboard" greeting that FAA Aviation Safety Inspectors always receive from a crew when they are given the word that FAA is going to perform an enroute inspection.

If they were not happy with me being on board initially, their sense of humor sure did not improve after we boarded the aircraft and the left engine failed to light off and the seven Albany passengers had to deplane.

The co-pilot was now checking his watch as he paced. It was obvious that he was anxious to fly the trip, anxious to put a few more hours in his log book, anxious to move up in his chosen profession. Have you noticed that most people on their way up are always anxious and self-centered? Earlier, the dispatcher told me that the co-pilot had interviews scheduled with three major airlines in the next two weeks. His future looked bright, he had set his goal and he was almost there. But now another delay, he was now stopped again—this time by a man in a winter parka.

The captain, ex-military retired C–141 driver, who had more silver in his hair than black, sat relaxed in a old chair reading the sports section of the *Washington Post.* Every now and then I noticed he smiled as he peeked over his reading glasses and watched his co-pilot wearing out his shoe leather and patience. I wondered, could the captain, with a sense of irony, be reliving through his co-pilot the same feelings, desires, and pressures that the quest for the front seat in heavy iron and the four stripes of power demand?

Looking back out the window I notice that the mechanic has finished installing the igniter box and secured the cowling. Immediately, other ramp personnel attach the tow bar to the aircraft and begin towing it to the gate.

The mechanic, now in one quick motion developed from years of practice, opened, entered, and shut the door to the line office keeping the loss of warm air to a minimum. His entrance was almost as fast as the second or two it took his glasses to fog.

The co-pilot, now visibly irritated at being delayed, grabbed his chart bag and overcoat and started for the door. He stopped, turned, came back to the dispatcher desk where the mechanic was standing, looked him in the eye and said, "You cost us 25 minutes, we missed our gate time." The mechanic, who was patiently polishing his glasses with a paper napkin, slowly considered the co-pilot's attack and quietly said, "I figure we are 33 minutes late, but the ball is now in your court, and you'd better get a move on." The co-pilot was about to say something he would probably regret later when the captain diplomatically interrupted and asked the mechanic to sign off the discrepancy and the flight release block. The mechanic complied by signing his name and certificate number which approved the aircraft for return to service.

The captain gave him a big smile, thanked the mechanic, and told him how much he appreciated the fast service and turned to me and asked if I was ready to board. "One minute, Captain, I would like to take a look at the maintenance record sign off. I'll bring the maintenance record with me." As the mechanic turned the maintenance record around so I could check his entry, the co-pilot, who was now being hustled out the door by the captain, could not resist taking one parting shot at the mechanic. "Better come with us right now, Mr. Inspector. It'll take the "Grease Monkey" another 33 minutes to figure out how to sign his name again!"

In that room, two aircraft mechanics jaw muscles tightened ever so slightly, mine and the man in the winter parka. The remark—although not aimed directly at me—hurt. Old familiar anger rose from my belly. Just enough of it slipped pass my defenses to flush my cheeks and, just as quickly, the anger faded. I reasoned the co-pilot, like many others, did not understand what it meant and what it took to become a mechanic. Let it pass.

I checked the record entry, thanked the mechanic, and shook his hand, picked up the maintenance records, and boarded the aircraft in plenty of time before the passengers were seated.

The trip to Albany was uneventful and thanks to a good tail wind, ATC direct routing, and a wee more power than normal, we were only seven minutes late at the Albany gate. I spent the rest of the morning and part of the afternoon performing an inspection of the commuter's maintenance facility. Because of a scheduling change I found myself with the same aircraft and crew for the trip back to Dulles. Again the trip was the kind I like the best—uneventful.

After the passengers deplaned and the aircraft secured, the crew and I were walking together to the parking lot when the co-pilot asked me, "What ex-

actly is an FAA Aviation Safety Inspector for Airworthiness, and what does he do?" In the 10 minute walk for the gate to the employees parking lot, I explained that FAA Airworthiness Inspectors certificate and inspect mechanics; certificate and inspect air carriers, repair stations, and mechanic schools; perform accident investigation; and give aviation safety seminars. It was one of my better attempts, I thought, to explain and justify my paycheck.

In the parking lot, I shook hands with both the captain and co-pilot, mentally noting the difference between the pilots' smooth grasp versus the mechanic's callous one. As I was persuading the government car to start, the co-pilot pulled up in his red *Firebird,* rolled down his window, and said, "Keep up the good work, Mr. Airworthiness Inspector, and keep an eye on those "Grease Monkeys" for us." Before I could answer, he let out the clutch and was gone. I never saw him again at Dulles. I heard that he got that job flying the heavy iron. That was over six years ago, but I am still bothered by his remark. Now more than ever, I very much would like to sit him down and explain to him what it is like to be a mechanic. I want to tell him who we are, what we do, the responsibilities that we carry, and how much we love our profession.

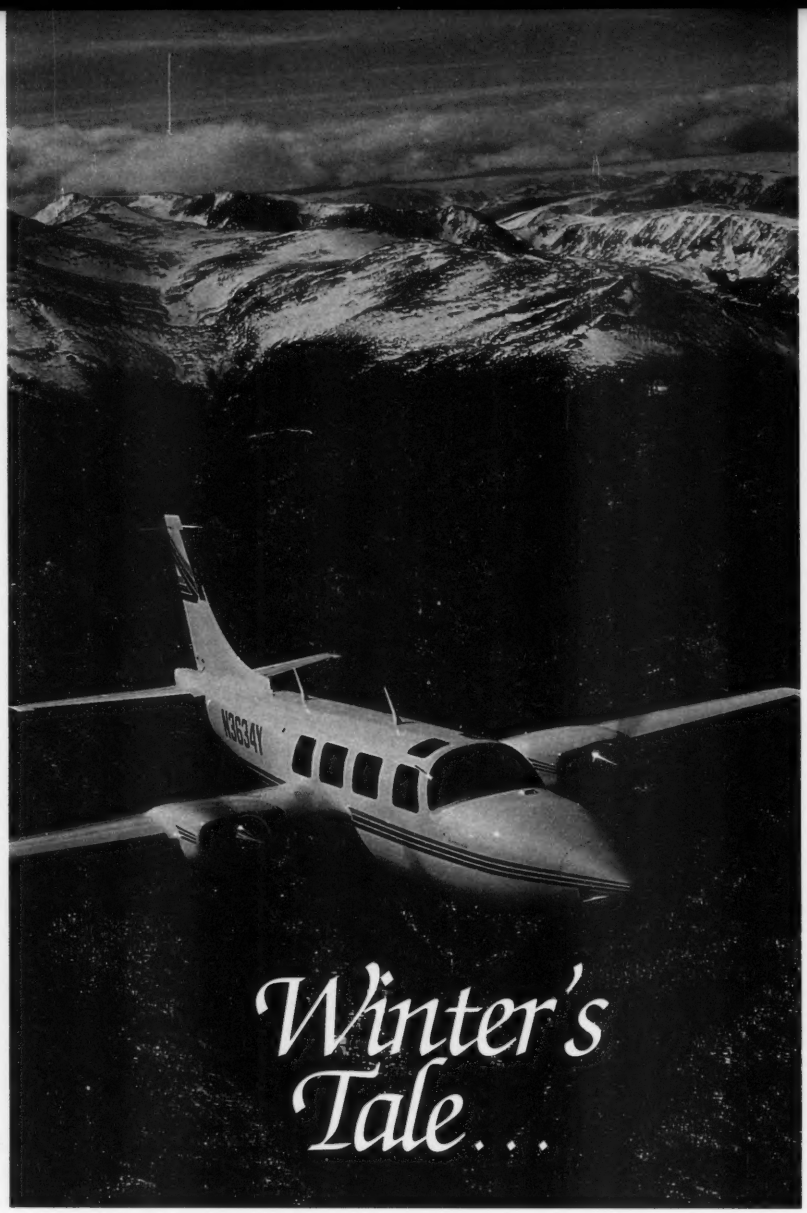
Maybe in your travels you might run into pilots who still likes to call us "Grease Monkeys." I would consider it a personal favor if you could just tell them three things about mechanics for me.

1. Tell them that mechanics love their aviation profession just as much as pilots do. But there is a difference. Pilots are in love with the magic and freedom of flight that flying an aircraft allows them to experience. Mechanics, on the other hand, carry on a technological love affair with the aircraft itself. This technological love affair is a complex one, involving hard numbers, close tolerances, and no margin for error. Because of this marriage of human feelings to technology, it is very hard to explain to someone outside this very private, very personnel profession what we are feeling when we take a sick aircraft and put it back in the air again. Perhaps, that is why no one sings songs or writes poetry about mechanics and their profession.
2. We have worked very hard to become an aircraft mechanic. We are the only maintenance profession certificated by the Federal Government. Just to qualify to take the battery of three written, three oral, and three practical FAA examinations for the mechanic's Airframe and Powerplant rating, an applicant must first graduate from an FAA approved Part 147 Aviation Maintenance Technician School. The school must cover 43 subject areas and provide a minimum of 1,900 hours of instruction.

   If an applicant makes application to take the examinations on practical civilian or military experience, he or she must show the FAA a minimum of 4,800 hours of airframe and powerplant experience. Perhaps a better way to remember the numbers is to compare them against 1,500 hours for an ATP or 1,680 required class room hours for a 127 college credit BS degree. In addition to the investment in time and training mechanics have to invest heavily in their tools. An average start up tool box will cost a mechanic approximately $3,000 to $4,000. We have earned the right to work on aircraft.
3. Mechanics are the muscle and bones of aviation. We are the quiet professionals who are working around the clock to ensure the safety of thousands of passengers on thousands of aircraft every day. We carry the burden of responsibility for thousands of lives willingly. Why then, since so much depends on the maintenance profession, would you want to call us "Grease Monkeys?" Can you picture aviation without mechanics?

   Thanks for listening. ■

My Dad always told his impatient customers that they had two choices—it can be fixed quickly or fixed correctly. To the condescending customers, he reminded them that he must know something they didn't, otherwise they would have repaired it themselves. This article is dedicated to all mechanics and especially to their children who were expected to apologize because their parent was "just a mechanic." —from the Associate Editor, a mechanic's daughter and proud of it.



A reminder to "Snowbirds" from NASA's ASRS newsletter, Callback.—Editor

To escape the harsh northern winters, "Snowbirds," and some pilots, fly south. Unfortunately, a few (pilots, that is!) get tangled in the Air Defense Identification Zone (ADIZ) trap.

From the Bahamas: *I flew through the ADIZ without knowing that mandatory flight plans, whether [the aircraft is] landing or not, are to be filed.*

From the Florida Keys: *I noticed a local NOTAM outlining required Defense Visual Flight Rules (DVFR) flight plan filing for all flights into and out of the Keys. . . . Most pilots would be unaware of the ADIZ crossing within the same state (i.e., coastline of Florida to Florida Keys).*

The ADIZ is an area of airspace in which ready identification, location, and control of civil aircraft is required in the interest of national security. FAR Part 99, "Security Control of Air Traffic," outlines procedures for aircraft operation associated with an ADIZ. Sectional charts may carry a variety of notations regarding the ADIZ, from warnings ("National Defense Operating Area") to instructions ("Report to FAA Radio prior to entering ADIZ"). But some sectional charts displaying coastal or border areas have no instructions or information at all.

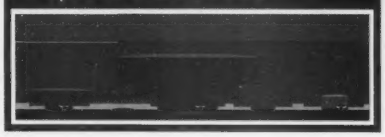
Pilots operating aircraft into, within, or across an ADIZ *must* file a flight plan with a Flight Service Station or other ATC facility. Aircraft on an IFR flight plan automatically conform with this ADIZ regulation. VFR aircraft must file a DVFR flight plan and comply with specific time- and position-reporting requirements.

The *Aeronautical Information Manual* (Paragraph 5–6–1) explains the aircraft equipment and reporting requirements for ADIZ flights, and offers this further caution: "An airfiled VFR flight plan makes an aircraft subject to interception for positive identification when entering an ADIZ. Pilots are therefore urged to file the required DVFR flight plan either in person or by telephone prior to departure." The following reporter, inbound from the Bahamas, discovered this the hard way:

[After several unsuccessful attempts to reach ABC Tower], we made the decision to use UNICOM frequency and get our flight plan in the air. . . . We contacted Center and told them our request and intentions. They gave us a squawk code and brought us into airport XYZ. [Upon landing], we were ordered out of the aircraft at gunpoint and made to lie face down on the taxiway.

Perhaps the best advice for preventing ADIZ entanglements comes from a government pilot and reporter to NASA's Aviation Safety Reporting System (ASRS). He was questioned by U.S. Customs officials about his lack of a flight plan, even though he was talking to the Customs office throughout his flight. His advice: *File and call Customs and whoever else (Coastal ATC) and let them know what your intentions are. Avoid the lack of communication between government agencies!* ■

AirspaceCORNER



• Surveillance Balloons

The "Tethered vs Moored Balloons" article in the October (1994) issue had special meaning to us pilots along the US-Mexican border. We have several moored balloons operated by the U.S. Air Force that carry aloft surveillance radar to detect drug-running airplanes that try to sneak across the border. Surrounding each is a 4 nautical mile diameter restricted air space, with the warning "Caution: strobe lights and unmarked balloon on cable to 14,000 MSL." Seeing one from the ground or from the cockpit convinces you to stay well clear.

I have several questions about these balloons. FAR Part 101 restricts moored balloons to no higher than 500 feet AGL, but these balloons go thousands of feet. As for clouds, I've heard (but never seen) stories that they sometimes are concealed within the clouds. As for the pennants or streamers required at 50 foot intervals visible for one mile, if they're there, I surely cannot see them when I drive within 300 yards of the Valentine, Texas, balloon. Do these balloons have the required run away rapid deflation devices? As for "restraining cables deployed in such a fashion as to restrict horizontal movement nearly to zero, "I've seen these balloons drift quite a way downwind.

Eric W. Berg
El Paso, TX

The answer to your questions is in FAR § 101.11. These balloons are operated within a restricted area large enough to contain both the vertical and lateral movements of the balloon. Because these balloons are flown within a restricted area, no other markings are required. Pilots are expected to stay out of the restricted area. Balloons operated within a restricted area must comply with FAR § 101.19, *Rapid deflation device*.

Editor's Note: The following letter is about winter survival. It offers several good suggestions. Since we published several articles on winter operations and survival in the November-December 1994 issue, we decided to add a few comments in response to this letter as survival suggestions for this year.

•Winter Survival

The article on winter survival in the November-December 1994 issue was very good. One item mentioned but not emphasized, however, that would enhance being found sooner rather than later is fire. The Canadian Aircraft Owners and Pilots Association stresses carrying waterproof matches. And when I fly in Canada or Alaska (Editor's Note: Canada and Alaska have specific survival gear requirements that pilot's must carry.), I carry not only waterproof matches but a container of rags and extra engine oil. The rags are helpful in wiping crud off the windscreen; the oil serves as engine reserves and can be used for that purpose if necessary. However, burning oily rags generate a lot of smoke. And there is nothing to catch a ranger's attention like a column of smoke rising from the woods. There are other simple things one might carry to help survive such as a hunting or other stout knife and a wire saw. Both of these are quite useful in cutting twigs and branches that can be used for building a shelter and for making a fire for warmth and signaling. A flare gun is small and adds little weight to the payload. A flare shot 150 to 200 feet into the air can be seen for quite a distance. And if your matches don't work, believe me, the flare will. And never, never travel into the wilderness(or anywhere else) without a handheld transceiver and GPS. Be prepared by knowing the ATC frequencies in your location at all times. If you see an aircraft or contrails overhead, even a high flying B747, tune to that frequency or to 121.5 MHz and transmit a MAYDAY message. There is a good chance someone in the crew will hear you. If you have a GPS, you can transmit the coordinates of your location.

I am sure that there are many other ways to assure your rescue, but I can't think of any more effective way than fire.

Irving Moskovitz
Pacific Palisades, CA

Thanks for your comments. You made several very good suggestions. We want to add several others. First, pilots are cautioned to use proper fire safety techniques when handling rags, any type of flammable liquid such as oil, matches or lighters, and any type of flare or flare gun. Although oil is normally packaged in its own plastic quart containers today, matches and flares should be packed in either the case designed for them or in some sort of metal container that can contain an accidental ignition. Although we know you referred to carrying clean rags, we want to remind young pilots that oil soaked rags should not be carried in an aircraft or left in a hanger because of the chance of spontaneous combustion. No one wants to lose an aircraft because of an accidental fire.

Flare guns and cartridges are a potential hazard and should be handled with the care given to any type of firearm.

A signal mirror and whistle are also important survival aids.

FAA AVIATION NEWS welcomes comments. We may edit letters for style and/or length. If we have more than one letter on the same topic, we will select one representative letter to publish. Because of our publishing schedules, responses may not appear for several issues. We do not print anonymous letters, but we do withhold names or send personal replies upon request. Send letters to Editor, FAA Aviation News, AFS–810, 800 Independence Ave., SW, Washington, DC 20591, or FAX them to (202) 267–9463. INTERNET address: Phyllis_Duncan@mail.hq.faa.gov

As you said, GPS units are great. GPS units designed for hikers can be purchased for less than $300. Aviation versions sell for less than $700. And according to a Bendix/King sales brochure, the new Bendix/King KLX 100 transceiver has a built-in GPS unit that includes a "S.O.S. Beacon" feature that can broadcast the unit's latitude and longitude along with a pilot customized message when the feature is activated. With so much electronic gear available today, pilots just have to remember to carry extra batteries in case of an emergency.

To help others find you, you may want to carry a personal emergency locator transmitter (EPIRB). Check out either a 121.5/243 MHz version or one of the newer 406 MHz units. In an actual emergency crash, pilots, if able, should check their aircraft's ELT to make sure it is transmitting by tuning their radio to 121.5 MHz and listening for the characteristic ELT signal.

Everyone with access to an ELT, either in an aircraft, boat, or a personal ELT, should always check it for inadvertent activation. False ELT signals can jeopardize the safety of rescuers that might respond to the signal as well as tie-up limited search and rescue resources.

Pilots should also monitor 121.5 or 243.0 MHz while in flight to check for activated ELT's. Even with satellite monitoring of ELT signals, an airborne detected signal by a pilot could speed up the search process significantly in the event of a missing aircraft.

But regardless of what type of signaling, location, and detection gear you carry, pilots and passengers must be able to survive the local environmental conditions they may land or crash in until help arrives. There have been cases, one in 1995, in which the pilot survived the crash but died days later because of exposure before rescuers could find the crash site. Pilots should dress for the worst possible anticipated survival conditions for the time of their flight. Even if a pilot fails to carry a survival kit, items in the aircraft, things in pockets and bags, and a pilot's will to survive can all help a pilot survive. But like any phase of flight, being prepared makes any flight a safer and more enjoyable trip. A basic survival kit does not have to be large, heavy, or expensive. A few common items will get you started.

For more information on survival items, you can review past articles in *FAA Aviation News;* visit your local marine equipment center or outdoor sports store; check your local library or bookstore; or contact your local Red Cross, Coast Guard Auxiliary, Civil Air Patrol squadron, local scouting organization, or government emergency services agency for more survival ideas and recommended emergency or survival items. Then when you make your aircraft survival kit, make one for each of your vehicles and home. If you go hunting or camping, pack a small kit in case you get lost or the weather changes. Just remember, you may want to change some of the kit's contents as the seasons change.

The following companies sell survival equipment. Some offer catalogs. ACR Electronics, Inc. (305–981–3333); Switlik Parachute Co. (609–587–3300); Exploration Products (1–800–448–7312); Global Survival Inc. (1–800–925–8088); and Sporty's Pilot Shop (1–800–543–8633) are only a few of the many companies that sell survival equipment.

Regarding survival equipment, FAA has various technical standard orders (TSO's) for aviation survival equipment required by Federal Aviation Regulations (FAR) to be aboard an aircraft. If you are buying equipment to comply with an FAR requirement, please make sure the items meet the appropriate TSO if one is published. The latest version of Advisory Circular (AC) 20–110, Index of Aviation Technical Standard Orders, lists applicable TSO's.

As always, FAA does not endorse any specific company listed in any story or article. Have a safe winter of flying.

• Straight in Approach

AIM paragraph 5–46a states, "If it is necessary, while circling to land, to maneuver at speeds in excess of the upper limit of the speed range for each category, due to the possibility of extending the circling maneuver beyond the area for which obstruction clearance is provided, the circling minimum for the next higher approach category should be used."

This paragraph seems to imply that if I am conducting a straight-in approach and I use the next higher approach category speed, for example, a Category A aircraft using a 100 knot approach speed, I am still allowed to use Category A minimums. I realize the missed approach segment is similar to the circle maneuver so the "next higher" rule would apply. If executing a missed approach at an airspeed higher than your category, what is the rule? Can I fly a straight-in faster and still use my aircraft category minimums, if I can safely land or slow to appropriate category speeds for a missed approach?

J. Fitzpatrick
Fairbanks, AK

As noted in the U.S. Government Flight Information Publication, U.S. Terminal Procedures, which is the instrument approach procedures publication, on page A1 under the heading "Aircraft Approach Categories," states in part than, "An aircraft shall fit in only one category. If it is necessary to maneuver at speeds in excess of the upper limit of a speed range for a category, the minimums for the next higher category should be used." This is an unqualified answer. You must use the appropriate category minimums for the speed you are flying.

• Addendum

The author of "How Much is Your Life Worth?" in the September 1995 issue of *FAA Aviation News* is Paul H. Davis, not David. Mr. Davis is one of only five U.S. Coast Guard Air Traffic Controllers in the world. He works the tower at Elizabeth City, NC CGAS. He is also an Aviation Safety Counselor, a CFI, a ground instructor, and C–130 Flight Engineer.

FSDO 15 Electronic Bulletin Board

The Orlando Flight Standards District Office (FSDO 15) Electronic Bulletin Board (BBS) provides 24 hour public access to FAA safety information and specific list-type information from participating FSDO's across the country. The free service provides airmen access to such information as safety meeting dates and locations, Service Difficulty Reports, Airworthiness Alerts, Aeronautical Information Manual data, Advisory Circulars, and select lists of medical examiners, designated pilot examiners, designated mechanic examiners, designated airworthiness representatives, computer testing examiners, airshows, and other such information from participating FSDO's. The BBS also has a question and answer section to answer questions not answered by the material on file.

Access to the Orlando FSDO BBS is provided by a toll-free telephone number 1–800–645–3736. Data format is N–8–1–ANSI, 2400–14400 BPS. The BBS is a "FidoNet" participant which can provide access to the Internet E-Mail system.

Any FSDO wishing to participate should contact Bill Hoenstine at (407) 648–6956 for details.

U.S. Air Traffic System Safest in the World

In response to reports of the U.S. air traffic system unreliability, Secretary of Transportation Federico Peña offered constrasting facts at a news conference this past September. Peña said, ". . . the plain truth is: the system is safer today that it was last year—safer than a decade ago.

"In fact, American skies are the safest anywhere, period. And flying continues to be the safest way to travel."

Peña cited charts that showed that air traffic performance was at a low point in 1985 (only four years after striking controllers were replaced). Even then equipment was up and running 98.6% of the time. September statistics showed it running at 99.4%.

Peña said, "That means 99.4% of the time the nation's air traffic control system is fully operational, 24 hours a day, seven days a week, every day of every year—even with 30-year-old system equipment. It's a real testament to the hard work and dedication of the technicians who keep the system working and to the air traffic controllers who use it.

"Still," he continued, "that's not good enough. I want availability to be 100% all the time. That's my goal."

The Secretary outlined a four-part strategy:

1. Agressively install the most technologically advanced system in the world—the AAS (Advanced Automation System), costing $5.4 billion: Installation of new, interim support computer software and hardware and begin replacement of all automation equipment at centers, TRACON's, and towers.
2. Hire more technicians nationwide (116 by October 1, 1995) and beef up training for technicians and controllers; install new, state-of-the-art equipment to stabilize electrical power at all air traffic facilities; place more controllers at the busiest air traffic facility, the Chicago center.
3. Ensure adequate funding from Congress—the full request for $4.7 billion in fiscal year 1996.
4. Work with Congress on reforming FAA to operate more like a business.

Secretary Peña provided details on each of the strategy points and concluded by indicating to the assembled reporters that in the 15 minutes he'd been speaking, "500 planes have taken off or landed safely. That doesn't make news. You won't write about that tomorrow. But it is a fact.

"We have the safest system in the world . . . and . . . we're going to make it even safer."

For copies of the Secretary's full remarks contact Office of Public Affairs at (202) 366–5580.

Remedial Training Records

A popular commercial aviation publication recently had an article entitled something to the effect of "There the FAA goes again!" An airman wrote in that he had applied for an airline job and had not been selected because an accident he'd had a few years before and for which he had participated in the Remedial Training Program in lieu of enforcement action. The pilot claimed that the remedial training, accomplished more than two years before, had not been expunged from his record. (Administrative actions like remedial training are expunged from the airman's record after two years.) The FAA was not living up to its promises, the publication's editor said, and was depriving pilots of their rights under the Constitution.

Wrong.

Think of your airman record as a computer directory with several different subdirectories: Enforcement History, Accident-Incident History, Medical Records, etc. Data is applied to those directories from several different main databases. Let's say you have a minor accident. As a result of FAA investigation of the accident, the inspector comes to the conclusion that remedial training is called for instead of enforcement action. After the pilot successfully completes remedial training and once the accident investigation is finished, data goes into the pilot's Enforcement History "subdirectory" and his or her Accident-Incident History "subdirectory." These two subdirectories are not linked; consequently, when the Enforcement History "folder" is expunged of a reference to remedial training, the Accident-Incident folder is not changed. In the Accident-Incident History folder, there is no reference to remedial training; so, the enforcement history is expunged, the airman's enforcement folder is "clean," but the Accident-Incident folder still contains a record of the accident.

Most likely the airline did not hire the pilot because of the accident history, not the remedial training reference. As a result of this situation, however, we are exploring whether an airman's name should be removed from the Accident-Incident database after a cer-

tain number of years as well. Current FAA policy is not to expunge accident data.

This could have been cleared up by a call to the local FSDO, where an inspector could have explained the difference.

ATC Announces Special Air Traffic Plan for Superbowl XXX

Air Traffic Control (ATC) will issued a special NOTAM describing the special air traffic procedures in effect in the Phoenix, AZ, area for Super Bowl XXX. Dates of the special operating plan are January 24–29, 1996.

The special air traffic procedures are designed to handle the anticipated increase in the number of aircraft operating in the Phoenix, AZ, area during Super Bowl XXX. During this time period, Phoenix will also host a major golf tournament. The special air traffic procedures are designed to enhance safety while minimizing air traffic delays. The special traffic management program will apply to unscheduled IFR arrivals and departures during the program dates and times.

The following airports are included in the plan: Phoenix Sky Harbor International (PHX); Scottsdale Municipal (SDL); Deer Valley Municipal (DVT); Mesa—Falcon Field (FFZ); and Goodyear Municipal (GYR).

The Williams Gateway airport is not included in the Special Traffic Management Program.

Arrival and Departure Procedures

The special procedures will be in effect for arrivals during the period January 24–28, (Wednesday—Sunday) during the times of 1500–0500 UTC (8:00 am–10:00 pm MST) daily.

Departure procedures will be in effect January 28–29, from Sunday 0100—Monday 0500 UTC (Sunday 6:00 pm through Monday 10:00 pm MST); exclusive of the hours 0900–1200 UTC on Monday.

Time Slots Needed

A slot time is required for all unscheduled IFR arrivals. A block time (i.e. 2200–2229) is required for all unscheduled IFR departures during this program.

How to Obtain a Time Slot/block

Beginning January 22, between 1300–0700 UTC (6:00 am and Midnight MST) daily, pilots may call the Albuquerque ARTCC Traffic Management Unit (TMU) to request an arrival slot time and reservation number. Calls can be made for a departure block time starting January 26th. The program applies to both domestic and international flights. The toll free number is: 1–800–879–4435

Calls will not be accepted outside the times listed above. Reservations can only be made 48 hours in advance of the proposed ETA/ETD. Pilots should be ready to provide their departure airport, destination airport and proposed UTC arrival/departure time. TMU will provide a time and reservation code which is to be included in the remarks section of the flight plan. Pilots must arrive in a window of 5 minutes before or 10 minutes after their slot time. Pilots must depart in the block time allocated by TMU. Users not complying with these times could face extensive delays.

EXCEPT FOR EMERGENCY SITUATIONS, AIR FILED IFR FLIGHT PLANS, CHANGES OF DESTINATION, OR AIRCRAFT WITHOUT CODED SLOT APPROVALS WILL NOT BE ACCEPTED BY ALBUQUERQUE ARTCC OR PHOENIX APPROACH CONTROL TO LAND AT PROGRAM AIRPORTS.

Aircraft Parking Availability

The issuance of an air traffic reservation time does NOT imply or have any relationship to overnight parking availability at these airports. Pilots are encouraged to obtain their own airport parking reservations as early as possible.

IFR Alternate Airports

Phoenix Sky Harbor should not be filed as an IFR alternate airport due to volume considerations at Sky Harbor. Williams Gateway is the only other airport in the Phoenix area that offers an ILS approach.

VFR Arrivals to Phoenix Sky Harbor

VFR aircraft desiring to land at Sky Harbor Airport may experience delays exceeding 30 minutes. Contact Phoenix Approach Control no later than 30NM from Sky Harbor for delay and Class B (BRAVO) clearance information. All VFR services (i.e. traffic advisories) will be available as traffic conditions permit. Delays up to 30 minutes should be expected. All satellite airports are accessible without transiting Class BRAVO airspace.

Over flight traffic not landing in the Phoenix area should avoid transiting within a 30NM radius of the Phoenix Sky Harbor Airport at and below 10,000 ft. MSL.

IFR and VFR Departure Procedures for Phoenix Sky Harbor

1. Obtain current ATIS on frequency 121.2 MHz prior to contacting clearance delivery.
2. Contact clearance delivery on 118.1 MHz no more than 20 minutes prior to estimated time of departure. On initial contact advise clearance delivery of the following:
   - full call sign
   - location on airport
   - IFR or VFR
   - destination
   - current ATIS code
3. All IFR departures require a block time during the Special Traffic Management Program time period. NO IFR SERVICE OR EXPEDITIOUS HANDLING WILL BE PROVIDED WITHOUT AN APPROPRIATE BLOCK TIME ASSIGNMENT. VFR departures do not require a block time assignment. VFR departures may anticipate a lengthy delay, perhaps 30 minutes or longer.
4. Contact ground control on frequency designated on ATIS prior to taxiing, advise location on airport. Piston aircraft should perform run-up on ramp prior to contacting ground control for taxi instructions.
5. Monitor appropriate tower frequency (118.7 MHz for Runways 8L/26R; 120.9 MHz for Runways 8R/26L) when approaching runway. DO NOT call tower until you are in the number one position at the runway holding position.

Phoenix Class B Airspace/Stadium Operations

Sun Devil Stadium lies within the surface area of Phoenix Class B airspace. Operations will not be permitted in that part of the Phoenix Class B airspace which is in the immediate vicinity of Sun Devil Stadium, at or below 3000 ft. MSL, between 0800 local and 2300 local on Sunday, January 28, unless specific approval has been obtained from Phoenix Tower before January 24. (Telephone (602) 379–4226).

Only specific operators/aircraft are eligible for the approval. These are as follows: media, law enforcement, blimps, commercial advertisers (banner tows), and helicopters transporting passengers to/from the temporary heliport "Superport" located one nautical mile east of Sun Devil Stadium. Before being given authorization to operate in the vicinity of the stadium or at the heliport, all aircraft operators/pilots shall be required to be briefed on stadium/heliport operations and be a signatory to a letter of agreement specifying operating procedures.

Aircraft operating within 15 miles of Phoenix Sky Harbor Airport should remain alert for numerous special aviation activities associated with the Super Bowl. Activities include: banner towing, helicopter, and blimp operations.

Air ambulance operations are excluded from the above restrictions.

See NOTAM for Complete Information

The NOTAM has detailed instructions, preferred routing information, airport diagrams and information, tower operating hours for those part-time towers involved in this special program and their frequencies as well as detailed information on flying into and out of both the Phoenix area and the Williams Gateway Airport (the former Williams AFB). Williams Gateway Airport is not a program airport.

Flight Plans and Weather Information

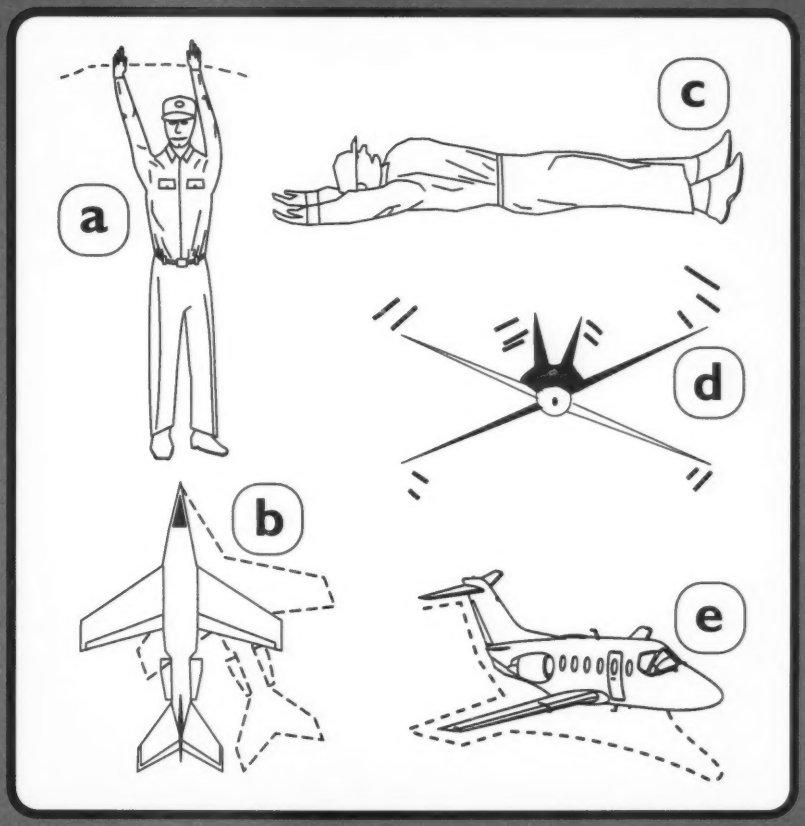
For weather briefing and flight plan filing contact Prescott Automated Flight Service Station: 1–800–WX–BRIEF (1–800–992–7433).

TESTESTEST Your Piloting IQ

Aviation Body Language

Immediate rescue after a forced landing or accident in winter weather is essential to survival. But rescuers also need to know what to expect at the scene. If you are forced down, are without radio capability, but are able to attract the attention of a rescue aircraft pilot, the signals illustrated on this page can be used to transmit messages to the pilot circling over your location. Be sure to stand in the open when making the signals and assure that the background, as seen from the air, is not confusing. Go through the motions slowly and repeat each signal until you are positive that the pilot understands you. Knowing the meaning of the rescue aircraft's reply motions helps to let you know your rescuers got the message. For more information, review paragraph 6-2-7 in the *Aeronautical Information Manual (AIM)*, and okay, this can be an open-book test.

Match the correct body (human or aircraft) signals with their meaning.



___1. Message received and understood by aircraft. Day or moonlight - rocking wings. Night - Green flashed from signal lamp.

___2. Need medical assistance - Urgent. Use only when life is at stake.

___3. Affirmative (yes) reply from aircraft. Dip nose of plane several times.

___4. Do not attempt to land here. Both arms waved across face.

___5. Negative (no) reply from aircraft. Fishtail plane.

ANSWERS: 1=d; 2=c; 3= e; 4=a; and 5=b.

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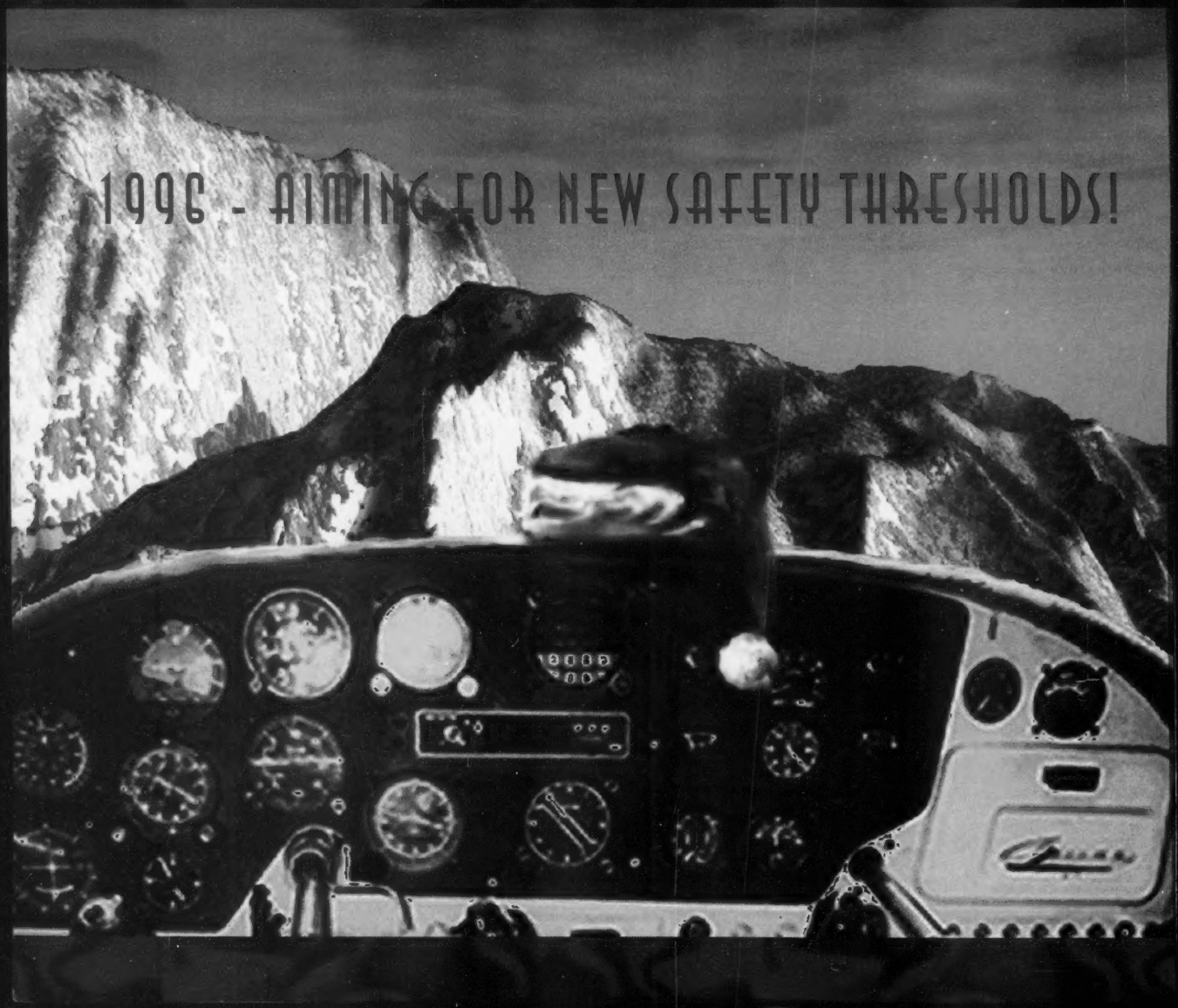

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